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ART. I.—BOULLAY'S FILTER AND SYSTEM OF DISPLACEMENT, WITH OBSERVATIONS DRAWN FROM EXPERIENCE. By Augustine Duhamel.

The term *methode de deplacement*, is of recent origin, and is applied to a mode of extraction by hydrostatic pressure, practically known for more than twenty years in Germany and elsewhere, though very limited in its application. It was bestowed by Mr. Boullay and Son, in 1833, who, by a development of the theory of this phenomenon, conferred inestimable benefit upon science.

The instrument employed for the purpose, was modelled after the *cafetiere de Dubelloy*, an apparatus once limited to the confines of the *cuisine*, but withdrawn from its humble sphere by the wisdom and foresight of Messrs. Boullay, to be rendered subservient to the uses of a scientific profession, in a more exalted and varied range of application.

Conjointly with the coffee apparatus of Dubelloy, the filter press of Real, of which the other is a modification, and the filter of Dumont, used for the decoloration of syrups by charcoal, were instruments in use, affording a practical illustration of this method. Besides these, the long adapters of Mr. Robiquet, placed in a matrass, should be noticed. In

the use of them, with Mr. BOUTRON, in a course of experiments when treating bitter almonds with ether, he remarked, that the ether acted in the manner of a piston, driving out the oil at a distance before it, without mixing with it; and we must not forget the experiments of VAUQUELIN, who verified the principle of displacement, by causing fresh and salt water alternately to pass through sand. These facts possess claims entitled to consideration, inasmuch as they contributed to the establishment of this theory.

But to the Messrs. BOULLAY belongs the honor of having established what was before a mere hypothesis. By their researches they not only proved that it admitted of very extensive application, but by furnishing practical results in some new and efficient preparations, they demonstrated it to be of the highest utility in pharmacy.

As it is necessary to bring into review what has been already written for the proper understanding of the subject before us, and as several elaborate treatises have been given by Messrs. BOULLAY, and a very able one by Mr. GUILLERMOND, of Lyons, wherein they fully detail the *modus operandi* of the *methode de deplacement*, and the results of their experiments, I cannot but avail myself of their labors; and though clothing their language in other words, and abridging the voluminous matter with the view to conciseness, I shall endeavor to do them justice.

The *methode de deplacement* is founded upon the ejectment of a quantity of liquid with which a powder may be saturated, by being subjected, in a proper instrument, to the action of a column of liquid, equal in quantity to that you would withdraw; or in other words, "a liquid impregnated with the soluble parts of a powder, in the midst of which it is interposed, abandons this powder when another liquid is made to act upon it."

To illustrate. Saturate with its menstruum some vegetable matter, in such a state of division as renders the liquid susceptible of ready contact with its particles, and then place it upon a funnel; by the addition of a column of water, alcohol,

or other fluid, you cause to be displaced from the substance acted upon, without intermingling, a like quantity of the vehicle replete with its active soluble principles, which escapes by the inferior part of the funnel. So that after the absorption by the vegetable powder of a certain quantity of liquid, every drop added to the surface causes one to fall from the bottom, each affusion driving the one before it through the incoherent mass, causing it to take up in its passage some soluble matter, and forming throughout the process successive strata of different degrees of strength, being less highly impregnated at the top, and more highly charged as it approximates to the bottom of the funnel.

Great attention had been directed to the importance of REAL's filter press, which consists of a tin box made to receive a saturated powder, upon which a vertical tin tube is made to fit, capable of containing a narrow but elevated column of liquid, to which was attributed its great power. Its supposed advantage was said to reside in its capacity to displace a quantity of liquid contained in the saturated powder, proportionate to the height of the column of liquid in the tube. Particular stress being given to the high pressure.

That any advantage is to be derived from the high pressure, the Messrs. BOULLAY are unprepared to acknowledge, the results of their experiments not justifying them in the belief. But, while unwilling to grant this, they accord to it the merit of enabling you to withdraw, even to the last drop, from a saturated powder, all its menstruum holding the active principles, by the employment of the smallest quantity of vehicle, an advantage not possessed by any other means in ordinary use. The limpidity of the products, the superior quality and abundance of extract which REAL's filter allows you to obtain, they also pass to its credit.

Operating independently of the filter of REAL, they experienced, in a most satisfactory manner, the same benefits, without other pressure than the simple weight of the quantity of liquid necessary for displacement. Since then the whole mechanism of the process resides in this, a column several

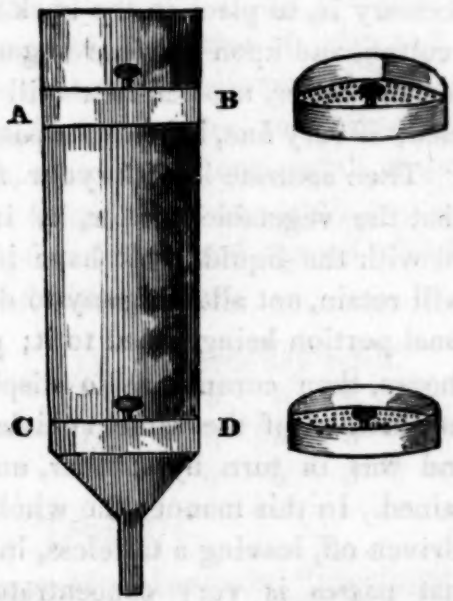
feet in elevation, if unnecessary, must be inconvenient; and as simplicity is an object we all seek to attain in our operations, and as the same, if not superior advantages can be derived by less complicated means, it requires no very cogent reasoning to prove which is best.

Since the introduction, by Messrs. Boullay, of this method, it has become general among the French *pharmaciens*, while their co-laborers on this side of the water have not inclined readily to its adoption. It is this apathy manifested in relation to it, that operates as an incentive to endeavor to awaken attention to it. I can only presume, that they are confined to the common routine by the apprehensions that always attend an innovation, for it only needs a fair trial to be properly appreciated.

Mr. E. Durand, ever anxious to keep pace with the progress of science, has, by its introduction into his laboratory, experienced the happiest results. Having myself realized the advantages of which I am about to speak, I unhesitatingly pronounce it the neatest, simplest, most expeditious, and productive method that offers, of extracting the virtues of a vegetable body.

In the different Pharmacopœias we may observe, in the formulæ under the head of tinctures, after specifying the proportions, the usual attached direction to macerate for a certain number of days and then filter through paper. But by simply filtering through paper, we cannot obtain the full quantity of menstruum employed; a greater or less quantity being retained in the vegetable substance, according to its nature, and when the substance is light, bulky, and abounding in mucilage, the quantity is very considerable. Here is an evident waste. Thus failing to obtain an entire collection of the products, the apothecary often recurs to the completion of his measure of menstruum, by supplying the deficiency in adding a new quantity of liquid, whilst, instead of abandoning the residuum, he might gather from it the liquid which saturates it, abounding in activity, did he bring to his aid the displacement system. It belongs equally to our duty in the

consideration of scrupulous nicety, not to disregard economy in our operations.



The filter of Messrs. BOULLAY consists of a long tin hollow cylinder, slightly conical towards the inferior part, and funnel-shaped at the extremity, to admit of being inserted in the neck of a bottle, which serves to support it, and at the same time to receive the eliminated liquid. At the part C D, is placed a metallic diaphragm, pierced with holes, fitting in accurately, and provided with a handle; its interposition is designed to intercept the escape of the vegetable powder: at part A B, a similar sieve reposes upon a small rim, intended to scatter the liquid over the surface of the vegetable recipient. One 14 inches in length, from one extremity to the other, and 2½ inches in diameter at the base of the cone; one 14 by 4, and one 17 by 6, are convenient sizes, according to the quantity you wish to operate upon.

But it is not essentially necessary that you should be at the expense of getting these instruments made. Glass adapters, of which there are various sizes, answer the purpose very well. Some beaks of broken glass retorts fulfilled my wishes completely. The adapters are best for ether and other vola-

tile liquids, or for substances with which it would be improper to use a metallic instrument.

All that is necessary is, to place in the neck of your adapter a piece of raw cotton, and upon this the vegetable substance in coarse powder, or, better, mashed in a mill and the fibrous parts well divided; if very fine, it becomes pasty and does not absorb readily. Then saturate it with your menstruum; by this is meant, that the vegetable matter, by incorporating or being moistened with the liquid, shall have imbibed a sufficiency that it will retain, not allowing any to drain off, except upon an additional portion being added to it; permit this contact for a few hours, then commence to displace the liquid by a convenient quantity of the same vehicle slowly added to the mass, and this in turn by another, until the desired quantity is obtained. In this manner the whole of the soluble principles are driven off, leaving a tasteless, inert mass.

The first that passes is very concentrated, and trickles slowly by drops, becoming less dense and weaker at each successive affusion, until near the end very little is left to be dissolved, as evinced by the following experiment of Messrs. Boullay.

Four ounces of bruised gray bark treated by displacement with 5 affusions of water, amounting to 2½ pounds, furnished the following products:

1st liquid,	3	drachms,	48	grs.	dry extract.	
2d	"	"	65	"	"	"
3d	"	"	15	"	"	"
4th	"	"	9	"	"	"
5th	"	"	7	"	"	"
Total	5	drachms,	16	grs.		

The use of a common funnel has been objected to, on account of its shape, from its distended sides, and consequent unequal pressure. But though this horizontal action has not been thought profitable, yet Mr. Emile Mouchon, an apothecary of Lyons, proves this supposition erroneous, from the

results of two experiments with the conical funnel, having given him real advantages over the cylindrical instruments. In advocating the preference of the *methode de deplacement* for the preparation of the resins of jalap and guaiacum, Mr. MOUCHON says, that with a common glass funnel he procured from good jalap, in fine powder, and mixed with 1½ its weight of animal black, a product of one-eighth of pure resin, whilst ordinary means furnish only one-tenth, and less pure.

500 parts of jalap thus mixed, treated with 750 parts alcohol of 34°, in three divisions, gave,

1st, 50 parts dry resin.
2d, 16 " " "
3d, 1½ " " "
— " " "
Total, 67½.

This resin, says Mr. MOUCHON, "precipitated from its alcoholic solution by 1000 parts of water, collected upon a filter and dried, was perfectly pure; when powdered it was white, but previously shaded and of a resinous aspect. In consequence of the exclusion of heat in this process, and being deprived of extraneous matters by the charcoal, it possesses twice the energy of the commercial resin of jalap. Four grains purged a vigorous adult."

What may be remarked as strange, is the fact that while by displacement Mr. MOUCHON obtained with the funnel one-eighth, the use of ROBIQUET's adapter gave but one-ninth, and BOULLAY's filter only an eleventh.

From 500 parts of powdered guaiacum, Mr. M. obtained 61 of resin by the funnel, with BOULLAY's apparatus 40, and ROBIQUET's, 48.

This so far is consistent with my own views, and, judging from experience, similar results would be likely to happen in its application to all substances rich in resin.

It having been proved that liquids naturally displace each other, the last portion of menstruum which saturates a powder may be displaced by another of a different nature.

Water displaces alcohol, and *vice versa*. In displacing one liquid by another, the interposition of a small quantity of the former is recommended, before the substitution of that by which you would displace it. In fibrous vegetable substances, or such as have been too coarsely bruised, the liquid runs off too fast. In this case the aperture of the funnel should be closed by a cork, and the drained liquid returned to the funnel : suffer it to remain for sometime, until all the finer parts subside, then remove the cork, and if it still flows rapidly, or has a turbid appearance, pass again, and repeat until regular and limpid.

The operation of continued displacement at first imposed upon me the necessity of watching it to keep up a supply of liquid, by adding from time to time new portions. But by resorting to the process of HAUY, jr., in simple filtration, this trouble is saved me, and my presence not even required, while the displacement goes on in a very uniform manner. It is by the superposition of an inverted bottle or matrass, filled with the same liquid as that with which you are conducting your operation, and with its mouth below the surface of the liquid in the funnel. As a drop escapes from the bottom of the funnel, a bubble of air which is seen to rise through the liquid, announces that a corresponding drop has filled up the vacuum. Previous maceration is deemed superfluous.

If the matter is much pressed, less liquid is absorbed ; the running is slower, and greater time is required.

You can operate by heat or cold as may be necessary, but heat retards the filtering from its action upon the farinaceous matters of the vegetable substance, causing a diminution of the interstices by the swelling of the mass.

An excellent evidence of the advantage of displacement adduced by Messrs. BOULLAY, is that of the cold water washings of herbs. We are all aware of the difficulty of filtering decoctions and infusions, and their oft-turbid appearance, especially that of bark, which when filtered, speedily resumes its opacity. Messrs. B. say that cold water displacement

affords a limpid product, that will keep twenty-four hours without alteration.

I had frequently essayed in vain to filter these decoctions beneficially, until by the trial of this method, I am happy to add my testimony in favor of Messrs. B.'s assertion.

Another great advantage is, that in thus treating vegetable matters with cold water, your extractive liquid is in a great measure divested of coloring matter, fecula, resinous, and other inert organic principles. Moreover, by this species of filtration the requisite quantity of menstruum can always be obtained, when otherwise, even while assisted by powerful mechanical pressure, a portion is lost by being retained in the residuary mass.

The more fully to exemplify the advantages, I have prepared a tabular view of the results of the experiments made by these gentlemen.

Comparative products by the different methods of extraction.

	Substances treated.	*By means of*	*Menstruum.*	*Extract furnished.*	*Quantity soluble.*
Boullay's Exp'ts.	Cinchona, 4 oz.	Maceration	40 parts cold water	5 drachms 30 grs.	5 drachms,
		Displacement	8 do. do.	5 do. 24 grs.	wholly,
		Displacement	4 do. alcohol 22°	6 do. 40 grs.	incompletely soluble,
		Decoction	10 do. hot water	4 do. 36 grs.	partially, do.
	Rhatany, 1 lb.	Maceration	4 lbs. alcohol 22°	29 do.	do. do.
		Displacement	4 do. do.	38 do.	13 drachms,
		Displacement	4 do. cold water	14 do.	wholly,
		Macer. and Displace.	4 do. boiling do.	25 do.	12 drachms.
		Decoction	4 do. do.	21 do.	9 1-2 drachms.
Guillermond's Experiments.	Rhatany, 185 parts	Maceration	810 parts cold water	25 parts	Remarks.—The three different modes of operation pursued were—
		Displacement	1200 do. do.	35 do.	
		Displacement	1950 do. alcohol 22°	59 do.	
	130 do.	Macer. and Displace.	1150 do. do.	58 do.	1st. The powder, wetted with twice its weight of menstruum, was subjected to pressure after a maceration of twelve hours, and fresh liquid, in quantity equal to the product obtained, added to the residuum.
	Dock, 200 do.	Maceration	855 do. cold water	43 do.	
		Displacement	900 do. do.	53 do.	
	Soapwort, 270 do.	Maceration	1760 do. do.	82 do.	
		Displacement	1000 do. do.	103 do.	
		Macer. and Displace.	1600 do. do.	108 do.	
	Liquorice, 330 do.	Maceration	1560 do. do.	59 do.	
		Displacement	1200 do. do.	98 do.	
		Macer. and Displace.	1400 do. do.	79 do.	2d. Continued displacement.
		Maceration	720 do. alcohol 22°	37 do.	
		Displacement	600 do. do.	37 do.	3d. Previous maceration, and then displacement.
		Macer. and Displace.	680 do. do.	38 do.	
	Senna, 170 do.	Maceration	525 do. cold water	28 do.	The substances were coarsely bruised.
		Displacement	1200 do. do.	33 do.	
	Digitalis, 250 do.	Maceration	1200 do. alcohol 22°	78 do.	
		Displacement	1400 do. do.	77 do.	
		Macer. and Displace.	1700 do. do.	80 do.	
	Cicuta 500 do.	Displacement	2700 do. do.	83 do.	
		Macer. and Displace.	2650 do. do.	66 do.	

The quantities of extract designated in the above synopsis, as having been furnished by *decoction* and *maceration*, are greater than would be produced by the common mode, as these gentlemen, after depriving the substance of as much liquid as pressure would allow, treated it by displacement, not to lose the balance retained. The results of these experiments tend to convince the most sceptical that the product by displacement is most abundant. Some of them I repeated, and though I find some little discrepancies in the proportionate quantities afforded, yet they were in the main correct.

It must be borne in mind, that the treatment of substances in large quantities does not always produce equally favorable results with minor experiments, neither does this method, applied to one kind, answer advantageously with all others. This depends in a great measure upon management. Attend to BOULLAY.

"The application of this method demands a special and profound study; the manipulation proper to one may not suit another. By a little variation, one who is careful may draw excellent results, while an unskilful person may miscarry with the most easy substances. Gentian, for example, swells so when wet with water, and the liquid becomes so thick, that the running is almost impossible. Express this tincture, and the remainder becomes easy to wash. Weak alcohol and wine traverse it much better. At the first washing, squill swells almost to a paste. The second no longer produces the same effect. Rhubarb in fine powder is with difficulty washed with water, because it augments considerably in volume. With coarse powder, the displacement is easy, and the washing perfectly exact, by reason of the porosity of the matter. Space gives rise to the same remarks, more or less analogous."

Gentian and burdock roots, and saponaria leaves, do not seem to answer by this process in operating with cold water, though they favor it much better in the treatment by alcohol. According to Mr. GUILLERMOND, sarsaparilla may be included in this remark. His experiments upon this root with cold

water having proved an exception to the general results, as here seen.

SARSAPARILLA, 120 PARTS.

1*st*.

Maceration.	*Displacement.*	*Mac. and Displac't.*
Water, 540 parts,	Water, 600 parts,	Water, 633 parts,
Extract, 20 do.	Extract, 17 do.	Extract, 19 do.

SARSAPARILLA, 300 PARTS.

2*d*.

Maceration.	*Displacement.*	*Mac. and Displac't.*
Water, 1200 parts,	Water, 2950 parts,	Water, 1350 parts,
Extract, 58 do.	Extract, 54 do.	Extract, 52 do.

3*d*.

Water, 900 parts,	Water, 1601 parts,	Water, 1022 parts,
Extract, 29 do.	Extract, 33 do.	Extract, 31 do.

This seeming inconsistency can only proceed from a difference in the degree of absorption. I have found, in moistening a vegetable powder placed in the funnel, that sometimes, from a greater porosity in one direction of the substance, the liquid would be freely absorbed, and percolation rapidly follow; while another part, in closer contact, would be quite dry from exclusion of the liquid. Where the saturation is incomplete, inequalities of product must ensue. With such as are likely to occasion this inconvenience, I first moisten the powder in a capsule, and then place it in the instrument, with a little pressure.

It must be borne in mind, that while the product in some instances is less by displacement, it is much more soluble, and far more active in medicinal properties, than when obtained by maceration or decoction. Witness the following experiments which I made with uva ursi, and likewise those of Messrs. B. as shown in the table, which are fully explicit upon this point.

UVA URSI LEAVES IN COARSE POWDER, 240 PARTS.

		Ext.	*Soluble.*
Mac. in boiling water,	5000 parts gave	48 parts,	33 parts.
Displac't. by alcoh. 22°	1920 " "	71 "	15 "
" " cold water	2500 " "	46 "	39 "

Here we perceive that while displacement by water appeared to give the least quantity of extract, it in fact gave most, 39 out of 46 being perfectly soluble. In some other experiments with digitalis and cicuta, joined with purified boneblack, I was repaid with extracts in quantity as much as one-fourth of the leaves employed, and of superior quality. That of the digitalis, particularly, was translucid, brittle, deliquescent, soluble, and withal powerfully active. The liquids were richly imbued with the peculiar odors of the plants, and in conducting the evaporation, their effects were sensibly felt by those remaining in the room.

That of the cicuta was friable, and appeared to have been deteriorated by heat in the reduction. The evaporation of the displaced products may be conducted over a spirit lamp, until the extract begins to thicken, when it should be removed to a water bath.

These suggested the idea of preparing aqueous extracts, concentrated in power, and resembling the essential salts of bark and opium in character, or as a substitute for the inspissated juices of the fresh plants. It is well to mention here that the experiments of Messrs. B. confirm the singular fact, heretofore announced, that cold water extracts from bark more of its soluble principles than hot water.

Since the adoption of the formula for the preparation of the sarsaparilla syrup by alcoholic maceration, it is generally adhered to, with the effect of procuring a more valuable syrup than heretofore. Whether apothecaries are particular in observing the *minutiæ* of direction I cannot say. That part having reference to expression and filtration through paper might be changed with advantage, by recommending the *methode de deplacement* for obtaining the whole product of the maceration. If it be required to operate upon as large a quantity

as fifty pounds of the root at once, in making this syrup, it may readily be supposed, that while the method directed might answer upon a limited scale, yet it would not do for so large a quantity. It not only exposes the operator to a loss by an attempt at expression with the common wooden press generally employed, but subjects him to a tedious process of passing the whole of the tincture through paper.

A very convenient mode is one which I have for a long time pursued, and which is as prompt as the other is wearisome. It is to drain off the macerated liquid, and place the residuary matter in a tight barrel, perforated at the bottom with holes, and supported over a proper vessel to receive the filtered liquid. Press the sarsaparilla, and other matters previously bruised along with it, into a mass sufficiently compact to prevent the finer parts being washed through the apertures, and disperse over its surface the decanted liquid. If what passes is not pellucid, then pass and repass until so obtained. After this, all that is necessary is to displace with simple water, until what comes over is devoid of color and taste. Then evaporate to the desired point, and form a syrup with sugar. Pursuing this system, I have likewise prepared, in imitation of Messrs. B., a syrup of rhatany, containing a half drachm of soluble extract to each ounce. It may be made double this strength. It proves highly beneficial in diarrhœa, and in all cases where astringents are required to be taken internally.

To embody in a small compass a medicine directing a special action upon the urinary organs, I prepared by this method some syrups of buchu and uva ursi, of concentrated activity, which, in the hands of Doctors Rose, Jackson, Hays, and others, proved of great service in obstruction, weakness, and concomitant diseases of the bladder. To form some idea of the strength of these and other syrups made in the same manner, I will give the relative proportions of substances I employed.

Syrup of Rhatany made with 8 ounces to the pint.

"	Buchu	"	4	"	"
"	Uva Ursi	"	4	"	"
"	Digitalis	"	4	"	"
"	Boneset	"	4	"	"
"	Bark	"	4	"	"
"	Pareira brava		4	"	"

Likewise rhubarb and others of officinal strength.

Thus far my remarks have had reference only to the application of the displacement system to vegetable powders. One particular use to which it is applicable, is that of filtering resinous substances. In the different treatises upon displacement, I have not seen any mention of its having ever been applied to substances of this character, or the remotest allusion to its possibility. It may have been deemed impracticable, from the homogenous nature of the resins, and tendency of their particles to conglomerate when brought in contact with alcohol. I was led to try this species of filtration by reason of the difficulty I had encountered in producing a clear solution of resin, in making some peculiar kinds of varnish which I had frequent occasion to prepare. Heretofore, by the process resorted to, the operation cost me considerable time, trouble, and attention. I had been accustomed to put the ingredients along with the alcohol into an alembic, and effect a solution by heat; as filtration through paper or other material was out of the question. I then put the vessel aside to allow a deposition of the impurities; this took place gradually, but demanded a long time for its completion, when I decanted my clear solution. This operation, every one knows, is attended with danger if not done in a water bath, through risk of combustion, in the event of a fracture of the vessel. Now, instead of operating by digestion, or any previous maceration, I commence by bruising coarsely my ingredients, after which I mingle with them about one-half their weight of coarse sand, clean and white, if intended for a solution having but little color, and with this some clean cut straw. Then in a large tin funnel placed in a bottle or other

recipient, first inserting a sufficient quantity of straw in the neck of the funnel, I pour my materials, settling them by slight agitation, then disseminate absolute alcohol, by portions at a time, over the surface, until the whole is made to pass in this way. The filtration goes on rapidly, and, at the end of the operation, nothing is perceived in the funnel but the straw, sand, and impurities which were contained in the resin. The solution is perfectly limpid, and possesses the proper requisite of a varnish *body*. It was considered by those in the habit of using it, equal in every respect to the other.

I succeeded by the same means in forming with myrrh a fine tincture, in a very expeditious manner. The alcohol at first passes off replete with all the peculiar fragrance of the myrrh, and imbued with a deep reddish color, gradually fading towards the close of the operation, until nearly colorless.

At its termination I passed water over what remained in the funnel, and obtained an opaque, yellowish solution, having the odor and taste of myrrh in a less sensible degree, which by evaporation yielded the extract of myrrh sometimes needed in medical dispensation. After this there remained but a small quantity of residuum, displayed in the form of a gelatinous mass of mingled white and yellow, together with some extraneous matters reposing upon the straw.

I also made some tincture of benzoin by displacement; the first that passed over was very dark in color; this was succeeded by an amber colored product, and the last that passed was colorless, leaving a residuum small in quantity and chiefly of fibrous matter.

Furthermore, some aloes and guaiacum, severally submitted to this treatment, proved additional auxiliaries in evidence of its power.

It is obvious to every one that this method possesses a decided advantage over the ordinary one for the preparation of the tinctures of the resins and gum resins, not only with regard to economy of time, but especially its nicety and perfec-

tion, added to cleanliness of appearance in a shop bottle, which, with no sediment in the bottom of it, is always ready for immediate use. Sometimes the dregs adhere so tenaciously to the bottle in ordinary maceration of a gum resin, as to be with difficulty separated.

Mr. Musculus, Pharmacien at Soultz, Lower Rhine, has published a process for making Kermes's mineral and golden sulphuret of antimony, by means of the method of displacement, proving that it may be applied to mineral substances.

ART. II.—OBSERVATIONS ON SOME OF THE CAMPHORIFEROUS ESSENTIAL OILS, AND ON THE RESINS EVOLVED FROM SOME OF THE VOLATILE OILS, BY THEIR REACTION WITH SULPHURIC ACID.

By William Procter, jr.

Two varieties of camphor are known to exist in Oriental commerce; one derived from the *Laurus camphora* of China and Japan; and the other from the *Dryobalanops camphora* of Borneo, a large tree, in which the camphor is found secreted in oblong cavities near the centre of its trunk. These cavities, in the young tree, are said to be occupied by an oily fluid, from which, as the tree advances in age, the camphor is deposited.

A specimen of this camphorous fluid was brought from the East Indies by Dr. Burroughs; a portion of which was obtained through Dr. Carson, at whose solicitation the following experiments were undertaken.

Oil of camphor (as the above mentioned fluid is called) is of a straw color, having the usual consistence of volatile oils. Its odor is camphorous, very permanent, and much resembles that of camphor wood: it has a pungent, disagree-

able taste, a density of .95, and is very soluble in alcohol and ether.

Experiment 1.—Supposing camphene to be the base of the oil, oxygen was transmitted through it for some time, with the expectation that absorption would take place, but without a favorable result. Another portion of the oil was exposed to an atmosphere of oxygen, during fifty hours, without alteration. A third quantity was distilled from the peroxide of copper, which merely had the effect to deprive it of color, and reduce its density to .935.

Experiment 2.—Oil of camphor was exposed to a temperature near zero of FARENHEIT's scale, which caused it to deposite a small quantity of camphor, having the sensible properties of the article of commerce. The greater part of the oil retained its fluidity; hence we may infer the quantity of camphor held in solution by the oil to be very small.

Experiment 3.—A portion of the oil which had been deprived of most of its camphor by refrigeration, was introduced into a small matrass. In another vessel the ingredients for generating oxygen were placed, from which vessel a bent tube proceeded through the neck of the matrass, nearly to the surface of the oil. Upon the application of heat to the respective vessels, the oxygen passed over into the matrass, where it became intimately mixed with the vapor of the oil, previous to its condensation around the neck of the vessel. By continuing this operation for a short period, the oil lost its transparency, was less fluid, and, on standing a few hours, deposited a considerable quantity of crystalline matter, identical with that obtained by refrigeration.

Experiment 4.—A portion of oil of camphor was introduced into a matrass along with four times its weight of nitric acid. Upon raising the temperature, deutoxide of nitrogen was rapidly evolved, accompanied by a sort of explosion. After continuing the ebullition for a short time, the evolution of the deutoxide ceased, and white vapors arose from the liquid, which were condensed in a vessel that had been previously inverted over the mouth of the matrass. This substance had

an acid taste, owing to the presence of nitric acid, from which, however, it was purified by agitation with an alkaline solution, and then presented the following characters, viz.: color white, pulverulent, the taste and odor of camphor, very volatile, and, on re-sublimation, presented more decided marks of identity with the latter substance. It is very soluble in alcohol and ether, and is deposited in crystals on evaporation. In this experiment we may infer that the oxidation of the camphene of the oil was effected by the decomposition of a portion of nitric acid.

Experiment 5.—Another portion of the oil was put into a glass vessel, surrounded by a frigorific mixture, and dry hydrochloric acid gas transmitted through it until saturated. Its color was changed to a dark purple, it fumed on exposure to the air, and had a density of 1.04. It was allowed to stand some hours and was then exposed to a temperature of 14° below zero of FARENHEIT, without losing its fluidity, from which circumstance we may infer the incapability of oil of camphor to yield artificial camphor by the above process.

Oil of Cajuput. From the same source as the oil of camphor, before mentioned, a specimen of cajuput oil was obtained, purporting to be authentically genuine, and which presented the following characters.

It was a limpid, pale green fluid, having a fragrant camphorous odor, a pungent taste, and a density of .8977. This oil retained its fluidity perfectly at a temperature of 30° below zero of FARENHEIT.

Experiment 6.—A portion of the oil was boiled with pure nitric acid, as in experiment fourth, which resulted in its conversion into resin at the expense of the acid.

Experiment 7.—Another portion of the oil was placed in a glass vessel, surrounded by a freezing mixture, and dry hydrochloric acid gas transmitted through it until saturated. Its color was changed to dark purple, and its specific gravity increased to 1.0170. On standing a short time it became solid, when by compressing the mass between the folds of bibulous paper, a whitish scaly matter was obtained.

This substance is soluble in alcohol and ether, and is deposited in acicular crystals, by evaporating its alcoholic or etherial solutions; also, very soluble in the oil from which it is derived, is nearly insoluble in the strong acids, and has a very peculiar odor, unlike any other with which I am acquainted.

Experiment 8th.—A portion of the above substance was added to a solution of nitrate of silver, in diluted alcohol, without producing any change, but upon adding a few drops of sulphuric acid, a copious white precipitate was produced, which was entirely dissolved on the addition of ammonia, which is sufficient evidence of the presence of hydrochloric acid in the compound.

Experiment 9th.—A portion of the substance obtained in experiment seventh, was intimately mixed with three times its weight of lime in powder, and the mixture introduced into a sublimary tube. On the application of heat, an oily matter and some water were condensed in the upper part of the tube. From this we may infer the decomposition of the compound, the chlorine of the hydrochloric acid unites with the calcium of a portion of the lime, while the hydrogen combines with the oxygen of the decomposed lime, forming water, which with the oily base of the compound is volatilized and condensed, and chloride of calcium remains behind.

Experiment 10th.—A portion of artificial camphor was treated as in the last experiment, which resulted merely in its sublimation, without being decomposed. The flame produced during the combustion of this substance, like that of artificial camphor, is tinged with green. Hence we may assert, that the substance generated by the action of hydrochloric acid on the oil of cajuput, is *not* artificial camphor, nevertheless that it is a compound of a carburet of hydrogen with the acid gas, similar in constitution to the *hydrochlorate of oil of copaiba.**

Several of the volatile oils are known to deposite, on long standing, a crystalline matter, which has been called *stearoptene*,

* See Traitè de chimie appliquèe aux art par J. Dumas, tome v. p. 676.

from its being supposed to bear the same relation to the volatile oils, as stearine does to the fixed oils. DUMAS,* however, has analyzed several of these deposits, the analysis resulting in the fact that they are species of camphor, differing from the *true*, in containing more or less hydrogen, while the oxygen remains the same in all of them. He has also informed us that the second class of essential oils may be considered as solutions, in various proportions of these camphorous bodies, in liquid carburets of hydrogen. That these carburets are *not* all identical in composition, is evident from the constitution of the camphors analyzed by DUMAS.

Camphor of oil of	peppermint,	$C^{10} H^{10} + O$.
"	true,	$C^{10} H^{8} + O$.
"	of oil of anise,	$C^{10} H^{6} + O$.

Camphor of Cinnamon, when pure, is a white substance, which is deposited from oil of cinnamon by long standing and exposure. It crystallizes in flattened oblique rhombic prisms, with truncated edges; soluble in alcohol and ether, and fuses at 248 degrees, FAR.; at which temperature it volatilizes rapidly, boils at about 420 FAR. without decomposition, and crystallizes on cooling.

It would have been an interesting link in the chain of discovery, had DUMAS, while investigating the camphors, also given an ultimate analysis of the camphor of cinnamon. It will probably be found to bear a near proportion to those already spoken of.

It has been observed that volatile oils increase in specific gravity by age and exposure, and this is accounted for by their absorbing oxygen. The difference between a camphor and a resin is, the greater proportion of oxygen entering into the composition of the latter. I have observed that these oils are differently disposed, as regards the absorption of oxygen; as, for instance, those of cinnamon, peppermint, anise, &c. yield crystalline camphors, while those of juniper, copaiba, &c. yield true resins. As an example, a bottle of oil of cassia,

* Annal. de Chimie et du Phys. vol. l. 235.

which had remained untouched for twenty years, was found when examined, to have deposited one-sixteenth of its weight of a yellow crystalline matter, while the supernatant oil was highly charged with the same, and had a density of 1.0935; that of the recent oil being from 1.03 to 1.04. Oil of juniper, which had stood nearly the same length of time, deposited a thick viscous resinous matter, of a dark claret color. Oil of copaiba is particularly disposed to deposite a resin by absorbing oxygen. From the above statement, it would appear that the camphors hold an intermediate place between carburets of hydrogen and resins.

Proust has advanced the idea that camphor is a characteristic ingredient of those volatile oils derived from the natural order of plants Labiateæ, and from the number of individuals already discovered to contain it, there is much probability in the assertion.

From the foregoing observations, it would appear that camphor bears the same relation to the oil of camphor, that other crystalline deposites bear to the oils from which they are deposited; also, that volatile oils contain less oxygen when recent, than when old; that the absorption of oxygen produces, in some instances, crystalline compounds, and in others true resins; and that the color and density of the oils vary in proportion to the quantity of these substances generated from and held in solution by them.

Hence the specific of oils, if taken properly, is a good test for their purity and age. A course of experiments on this subject, might result in the discovery of a standard by which to judge of the purity of volatile oils. If all those plants which yield essential oils, were tested as to the time most proper to obtain these substances from them, and that period of their age recorded, we have every reason to believe that the density of the oils obtained from different individuals of the same age and species, would be nearly alike; therefore, all specimens which would not come up to the standard, should either be rejected as adulterated, or as having been distilled before the proper period. Should, however, the oils be of greater specific

gravity than the standard, we might be led to infer, either that they had been obtained from old plants, or that the oils themselves were old, which is very frequently the case. In evidence of the above, the following is a comparison between the specific gravities of some old and recent essential oils, viz.:

Ol. gaultheriæ,	1.1920	old.	recent.	1.1700
Ol. cinnamoni, (cassiæ,)	1.0935			1.0498
Ol. caryophylli,	1.0700			1.0610
Ol. fœniculi,	1.0450			.9970

Professor HARE* has tested the action of sulphuric acid on three of the volatile oils,—those of sassafras, cinnamon, and cloves,—resulting in the evolution of as many resinous substances, to each of which he has given a name. I have carried out his idea, with as many of the essential oils as were procurable; all of which yield resins, more or less characteristic, while at the same time they agree in the general properties.

They all communicate a tinge to concentrated sulphuric acid, varying from pale brown to crimson; and they are all soluble in alcohol and in ether, and when free from adhering oil, are nearly inodorous. They were prepared by acting on the oils with sulphuric acid, and subsequently washed with ammonia, nearly as directed by Professor HARE.

The resins produced from the oils of hemlock, rue, bergamot, camphor, and wormwood, vary in color from black to grayish brown; those of lavender, neroli, valerian, origanum, lemon, horsemint, rosemary, peppermint, cubebs, turpentine, and pennyroyal, are greenish brown; and those of simple mint, fennel, tansy, savin, wormseed, carraway, juniper, anise, roses, bitter almonds, cajuput, and jasmine, from pale reddish brown to deep red.

Of these, those of the oils of fennel, tansy, camphor, anise, juniper, and wormseed, communicate dark red tints to sulphuric acid, the two former imparting almost as deep a hue as the resin of cinnamon.

* See two papers by Professor HARE, Amer. Jour. Pharm. vol. iii.

Prof. HARE has suggested that those oils which contain the largest amount of oxygen, are the most readily oxidized, which accords with my experience; nevertheless, those which are admitted to contain no oxygen, (copaiba for instance,) also yield resins; hence we are led to the belief that the oxygen required in the generation of this class of resins, is obtained principally at the expense, either of the acid or its water.

ART. III.—NOTES ON FALSIFICATIONS AND ADULTERATIONS.—No. II.

SINCE writing the first number of this series, (vol. ix. p. 17,) I have been looking for some of my fellow members of the College of Pharmacy, to lend the aid of their pens, in support of what appears to be one of the most necessary and most legitimate objects of this Journal, and of the attention of the College. But as no second number has yet made its appearance, I conclude that most others, like myself, find it more agreeable to sit still and say nothing, than to tell wholesome truths, which may grate upon the ear. I still hope, however, that the third number will be contributed by some pen better qualified than my own; and in the mean time have thrown together a few facts which have occurred at various periods during the past year.

Oxide of Zinc.—It would be well for our apothecaries, generally, to examine their articles under this name. Probably few would find, on adding sulphuric or muriatic acid, that there was not a copious effervescence of carbonic acid; and it appears that in some instances even carbonate of lime has

been unconsciously bought by the retail druggist, for oxide of zinc. The physician will easily judge what must be the difference of effect.

Nitrate of Silver.—It is a fact, well known among druggists, that large quantities of lunar caustic are constantly sold, of a very impure quality; and strange as it may seem, there are druggists, as well as manufacturers, who defend the practice. Some of the manufacturers plead in defence, that they sell the article to those who *know* it to be impure, and that they, consequently, are guilty of no fraud. But the fallacy of this argument is at once apparent, if we consider that the dealers who buy an impure article from the manufacturer, would undoubtedly avoid purchasing it were it labelled as, if made at all, it should be labelled, "Impure Lunar Caustic." Now whence arises this reluctance to purchase the article under such a label, but from a consciousness that it would not be bought by the consumer? Is it not, therefore, as plain as the sun, that there is a consciousness, latent though it may be, that this impure nitrate of silver is *eventually* to be sold to persons who are *not* aware of its impurity—who purchase it as a pure article? I hold it to be criminal, wilfully to adulterate a chemical preparation for the sake of selling it cheap; inasmuch as, in the first place, it involves an undeniable falsehood; and in the next place, it greatly jeopardizes human life, which, in disease, frequently depends on the prompt and decided action of the remedy. But to confine ourselves to the subject of lunar caustic: It is sold very extensively over the United States, of various degrees of impurity, and of course (by wholesale) at various prices. Any one acquainted with its composition, and with the present price of silver, will readily perceive that no manufacturer can profitably sell it under sixteen dollars the pound, avoirdupois, even reckoning nothing for the cost of manufacturing. But it has been sold largely for six dollars per pound, and perhaps less. What then must be the quality of the article? We shall soon see.

I dissolved a portion of this suspected lunar caustic (fifty grains) in distilled water, and added pure hydrochloric acid until it no longer threw down any chloride of silver. After subsiding, the chloride was carefully separated by decantation, and when dry it weighed ten grains, which indicated about seven and a half grains of pure silver ; say fifteen per cent. The atomic weight of silver being 108, and that of the nitrate 170.3, this fifteen per cent. of pure silver was equivalent to about twenty-four per cent. of pure nitrate. There was, besides, nearly half a grain of insoluble matter, separated from the watery solution, which appeared to be oxide of silver. So that, allowing a little for the inaccuracy of the weights in the manufactory, we may state the quantity of real nitrate of silver in this article as about twenty-five per cent. The rest, about seventy-five per cent., was found, when evaporated and crystallized, to be nitrate of potash, common nitre ! Some of this *caustic* was moistened and rubbed on the hand. On drying, it formed, indeed, sufficiently beautiful acicular crystals of nitre; but after many hours exposure to the light, left on the skin only a slightly dirty mark ; no blackness, and no darkness of the cuticle. Country physicians and druggists may thus see the advantage of purchasing cheap chemicals.

Spir. Ætheris Nitrici.—The remarks made in the above paragraph will also apply to this article, which is often found of a quality calculated rather to produce intoxication in the system of a debilitated patient, than the genuine effects of the sweet spirit of nitre. The venders assign the plea that they have two articles; the one termed "*Sp. nitri dulcis,*" which they acknowledge to be a *weak* article, though the term is very ill applied, inasmuch as it contains a large proportion of alcohol ; the other, termed "Spir. æther. nit." is only to be sent out to particular persons, as it is the genuine article, and of course at a higher price.

The only possible motive for this distinction is the sordid desire for gain, even at the expense of a clear conscience and the health of our fellow creatures. I have now before me a

price current of a large house, and I am happy to add that it is not a Philadelphia house, quoting this "Sp. nitri dulc." at nine cents per pound! Can any one believe that this is spirit of nitrous æther?

Oxalic Acid.—An eminent professor of chemistry in one of our universities, writes to us that a quantity of this acid, which he recently purchased in another city, and which was doubtless imported from abroad, contained about one-third its weight of supertartrate of potass. Its purity may readily be tested by dissolving it in a sufficient quantity of water, adding carbonate of lime cautiously, until effervescence ceases, filtering, drying the precipitated oxalate of lime, and observing that for every hundred grains of oxalic acid, if pure, there should be a product of about two hundred and five grains of oxalate. As, however, in operating on a small quantity, a slight difference of weight, which might be produced by the presence of tartrate of lime along with the oxalate in the precipitate, might not be observed, the purity of the acid may be still more satisfactorily ascertained, by digesting this supposed oxalate of lime in a solution of tartaric acid, and again drying it. Should any tartrate have been present, it will have been taken up by the acid solution, which will be indicated by the loss of weight in the precipitate.

Phosphate of Lime.—We purchased, last year, an article under this name, which, on examination, proved to be little else than the *carbonate of lime*, that very useful and convenient material, where any white powder is concerned. This article had been levigated and dried in flat and broad drops, rather more compact and brittle than the drops of *Creta præparata.*

Potassæ Sulphas.—A quantity of sulphate of potass was sent to us, last year, more than one-half of which consisted of crystals of a greenish white color. On examination they were found to be contaminated with sulphate of copper.

What quantity of the article may have been thrown into the market, we have no means of ascertaining.

Falsified Labels.—Under this head, it may be sufficient to observe, in general, that considerable quantities of some of the rarer chemicals, prepared in this country, and, for anything that is known to the contrary, equal to any made abroad, are constantly vended under labels asserting them to be from French houses. This falsity is not confined to one city. It may generally be discovered by the careful scrutiny of an eye accustomed to the French labels. But, by the country druggist or physician, with whom chiefly the deception is intended to take effect, it is scarcely probable that it will often be detected. It cannot be said to be an evil endangering the health of the community, except in so far as it indicates a want of sound principle on the part of those who have our lives in their hands; but, as a *falsehood* of extensive currency, it should be discouraged by all conscientious members of the pharmaceutical profession.

W. H., Jr.

Philadelphia, Third mo. 3d, 1838.

ART. IV.—NOTICE OF THE TRUE JALAP PLANT.

(*Ipomœa Jalapa.*)

In the American Journal of Medical Sciences for February, 1830, is a paper upon the above named plant, by Dr. J. Redman Coxe. Jalap tubers, in the living state, having been sent to him from Mexico, he was so successful in their cultivation, as to be enabled to present a description and figure of the plant when inflorescence was complete. A memoir upon the subject of jalap, in which reference is made to the preceding, and accompanied with the figure, was published in this Journal, (vol. ii. p. 22,) by Daniel B. Smith, Esq. During

the past summer a number of recent tubers were likewise received in this city from Dr. Burroughs, United States Consul at Vera Cruz, which throve well in the hands of individuals to whom they were committed; one of them attained the state of inflorescence in the green-house of Prof. Wood; the characters of the plant agreed with the accounts contained in the communications referred to. The tubers possessed the same sensible properties as the officinal drug. This confirmation of the facts announced previously, must settle the mooted question among botanists, as regards the source of jalap.

J. C.

SELECTED ARTICLES.

ART. V.—NOTICES OF THE CLOVE AND CINNAMON.

By W. S. W. Ruschenberger, M. D.

(Extracted from his work entitled "A Voyage round the World," &c.

We present to our readers the following notices of two spices peculiar to the localities visited by Dr. Ruschenberger, during his cruise round the world in the United States ship Peacock, a history of which has recently been given to the public; they are interesting from the fact, that the information therein contained was derived from such sources as secures to them implicit confidence, at the same time that they exhibit the freshness that recent personal observation bestows.

Cloves.—Among the objects of the cruise was the conveyance of the ratified treaty between the Sultan of Muscat and the United States.

Accordingly, the first place touched at, after doubling the Cape of Good Hope, was the island of Zanzibar, forming a part of the dominions of his Highness, situated on the 6th parallel of south latitude, and on the 39th of east longitude, twenty-three miles from the eastern coast of Africa. It was here that the above named product was met with, a plantation of the Sultan having been visited. We extract the following notice of it:

"The house stands in the centre of a yard about one hundred and twenty feet square; its walls are of coral, about seven feet high, and enclose several out-buildings for slaves, and, near the mansion, a small garden, in which were flourishing, together, the rose-bush and nutmeg tree. As far as the eye could reach over a beautifully undulated land, there was nothing to be seen but clove trees of different ages, varying

in height from five to twenty feet. The form of the tree is conical, and the branches grow at nearly right angles with the trunk, and they begin to shoot a few inches above the ground. The plantation contains nearly four thousand trees, and each tree yields, on an average, six pounds of cloves a year. They are carefully picked by hand, and then dried in the shade; we saw numbers of slaves standing on ladders, gathering the fruit, while others were at work clearing the ground of dead leaves. The whole is in the finest order, presenting a picture of industry, and admirable neatness and beauty.

"It is pretty generally known that the Dutch, for nearly three centuries, have been deriving great commercial advantages by their exclusive possession of those islands in the Indian Archipelago which produce the nutmeg and clove trees. In order to appropriate these spices to themselves, they either destroyed or enslaved those people who possessed them. They uprooted numberless trees, and even burned the fruit which they had already prepared, lest, by bringing a large quantity into the market, the price might be reduced, though it was in their own hands. Such barbarian avarice excited the indignation of many, who longed to foil and afterwards laugh at their policy.

"M. Poivre, who had visited many parts of Asia, in the character of naturalist and philosopher, availing himself of the official station he held as Governor of Mauritius, or Isle of France, sent to the least frequented of the Moluccas in search of those precious plants. Those whom he had commissioned were successful in the enterprise, and on the 27th of June, 1770, returned to the Isle of France, with four hundred and fifty nutmeg, and seventy clove tree stalks, ten thousand nutmegs in blossom, or ready to blossom, and a box in which clove seeds were planted, many of which were above the earth. Two years afterwards, he obtained even a larger supply.

"Some of the plants were sent to the Sechelles, to Bourbon, and to Cayenne, but a greater number were retained in the

Isle of France. All those distributed to private individuals perished; and in spite of the care of skilful botanists, a most unremitting attention, and considerable expense, only fifty-eight nutmeg, and thirty-eight clove trees were saved. In 1775, two of the latter bore blossoms, which became fruit in the following year, but it was small, dry, and light. Little hope of final success was entertained, and it was thought, at the time, the Dutch had been unnecessarily alarmed. However, it appears that the enterprise and industry of the cultivators were rewarded in the end, and they had the pleasure of seeing these spice trees flourish in their new location.

"They were introduced into Zanzibar, from Mauritius, in 1818, and are found to thrive so well that almost every body on the island is now clearing away the cocoa nut to make way for them. The clove bears in five years from the seed; of course time enough has not yet elapsed for the value and quantity of Zanzibar cloves to be generally known; and it may be said, the clove trade is still in the hands of the Dutch. It has been a monopoly ever since they obtained supremacy in the Moluccas; in their possessions, the cultivation of the tree is restricted to the single island of Amboyna.

"Cloves are now 55 per cent. dearer than when first brought round the Cape of Good Hope, and are sold to the consumer at an advance of 1258 per cent. on the first cost of production. The price for Molucca cloves, in the eastern market, is from 28 to $30 per picul of 133 lbs.; for those from Mauritius, 20 to $24 per picul.

Cinnamon.—Colombo, in the island of Ceylon, having been touched at, the following notice of cinnamon is given:

"Cinnamon is the most profitable of the vegetable productions of Ceylon, and yields a considerable revenue to the government, being, for 1831, not less than £106,434, sterling. Since 1832, however, several very important changes in the law relating to it have been made. Previous to that period, it was a monopoly in the hands of the East India Company, and its cultivation was saddled with many onerous restrictions.

At present it is freely cultivated, and may be exported to any port in the world, on paying a duty of three shillings the pound. The value of the cinnamon exported in 1834, was £32,741 $\frac{1}{2}$ $\frac{1}{0}$, an amount very much less than for several previous years."

The following account is given of a visit to a cinnamon plantation:—

"We alighted at the mansion of Mr. L———, and, after paying our respects to the ladies, were led through the cinnamon grounds; but there was no odor, no "spicy breezes," nor could we perceive any thing like a cinnamon smell, not even when the very bark, still attached to the stick, however, was put under our noses. At the season of cutting, I was told by Mr. L———, the odor was any thing but agreeable, bearing more of the hercine offensiveness, than of the spicy aroma upon which poets love to dwell. The leaves, however, which are from five to eight inches long, by about three broad, and of a dark shining green, when mature, emit a strong smell of cloves, if broken or rubbed in the hands. The cinnamon (the spice) is the true bark, outside of which there is a tasteless, cellular cuticle, which the cinnamon peeler scrapes off with his knife before he removes the spicy bark. Were it not for this cuticle, the essential oil might be evaporated by the heat of the climate, and leave but an inodorous, tasteless, substance, instead of the aromatic, which is so highly prized.

"Garden, sir!" replied a midshipman, when asked how he liked the cinnamon garden—"garden, sir!—it is nothing but a wilderness of green bushes and shrubs;" and such, in fact, it is. The cinnamon, when not interfered with, grows into a tree, twenty feet high, and eight or ten inches in diameter at the base of the trunk; but when cultivated for the sake of its bark, it is not allowed to exceed eight or ten feet, with a diameter from one to two inches. The stalks, which shoot up in a cluster of eight or ten together, are cut once in about three years close to the ground. On Mr. L———'s planta-

tion the earth is accumulated around the roots, and, to retain the water, cocoa nut husks are placed about them, which, in time, form an excellent compost. It is cultivated by suckers generally, and sometimes from the seed, in which case, the young plants are kept in a nursery for a year or two, and then transplanted. Besides cinnamon and cinnamon oil, the plant yields, from its dark green leaves, a clove oil, which affords a very considerable profit.

While the Dutch held the government of the island, only a fixed quantity of cinnamon was allowed to be grown, the policy being to get as large a money return for as small a quantity as possible; and it is stated, that when the crop was greater than the demand, at the established price, the surplus was burned. Private individuals were inhibited its cultivation, nor were they permitted to cut a branch of the plant, even if it grew wild upon their estates, under the barbarous penalty of losing a hand. After the English got possession of Ceylon, the East India Company obtained a monopoly of the cultivation and sale, which was held until the year 1832; its growth and exportation have since been free, upon paying a duty of three shillings per pound on all qualities, equal to about six hundred per cent. on the cost of gathering, which is estimated at sixpence. During the existence of the monopoly, all the cinnamon was collected by the agents of the Company, sorted, packed, and sent to England, whence it found its way to the different countries of the Christian world. This course and policy brought an inferior article into market under the name of cassia, which, from its cheapness, has to a very great extent superseded the fine cinnamon.

"The cinnamon oil is obtained from the fragments of bark which are made in pealing, sorting, and packing."

ART. VI.—SOME FACTS CONTRIBUTING TO THE PHARMACOLOGICAL HISTORY OF QUASSIA. By M. Planche.

If, in the study of bodies, either natural or manufactured, which are employed to produce some salutary change in the economy, a greater degree of interest should attach to their active principle, there is no reason that facts of a secondary nature should be neglected, as these possess utility in the pharmaceutic history of such bodies; among the number of which quassia may be ranked.

The want of agreement which exists between different naturalists and pharmacologists, upon the botanical species, to which the quassia of the shops is to be attributed, entails a like uncertainty as regards that which has been experimented upon by chemists. Until some well informed and disinterested observer has studied, upon the very localities, the two species in question, the *Quassia amara* and *Quassia excelsa*, until the difference that exists between the wood of both has been established, we must remain in the uncertainty of probabilities. Happily, the decision of the question is of little importance to therapeutics, as the medical properties of both are the same.

Taking things, then, as they exist, and only having in view, to point out some facts relating to the quassia of commerce, and some of its preparations, we ought, in the first place, to state, that the article met with, at the present time, resembles, as to color, texture, and taste, that which existed forty years ago. We allow at the same time, because we have observed it, that in this interval the billets of quassia brought into the market have varied in size, and even in color, but have always preserved the same bitterness peculiar to the substance, as well as all the chemical properties ascribed to it by Thompson. Thus, we have seen, in 1817, logs of quassia which were not less than three feet in length and eight or nine inches in diameter, presenting interiorly veins of yellow and gray, with patches of some extent of a pale yellow color,

without mixture, and others of a reddish gray, analogous in tint to the St. Lucia wood, (*Prunus mahaleb.*) I have had in my possession may pieces of this size, with one of which I had constructed, at the time, a fountain of the capacity of six pints, as well as other vases of different forms, for a Russian prince then in Paris. Upon this same quassia the following observations have been made, which will include, first, the wood and the efflorescence upon its surface; then the ashes, the wine, and the extract of quassia. We have thought that we ought to invert the chronological order in which these experiments have been made, which, however, is of little consequence in the end, so that we may not have to return to the wood after its preparations have been discussed.

Crystals of Nitre collected from Quassia. The part of the wood on which they have been exhibited.

At the same meeting of the Society of Pharmacy (*February*, 1829) that M. Guibourt presented a stethoscope of cedar, in one of the cavities of which was observed a crystalline formation, attributed by our skilful associate to the condensation of the aromatic principle of this wood, I announced verbally, and without any details, that I had observed crystals of nitrate of potassa upon cups formed of quassia wood. I now return to this fact, with some illustrations, which may throw still greater light upon the ulterior formation of this salt in the extract. Nitrate of potassa, so common in herbaceous vegetables of different families, has been observed, so far as my information extends, in but a single ligneous vegetable substance, the wood of quassia; and this has been the case during a period of nineteen years,* which does not disprove the existence of the same salt in other woods, considering so small a number of them have been analysed.

It may be possible, although in opposition to received ideas, that the nitrate of potassa, if it exist in the different woods serving for the fabrication of salts, may be found in part in

* At this period dates the use of goblets of quassia wood in France, now almost forgotten.

their ashes. But the time has not come, to say upon what this supposition is founded. I return to quassia. The points, or rather the numerous small black lines observed upon the longitudinal section of this wood, according to M. de Lens, who has made an anatomical examination of them at my solicitation, are the extremities of the medullary rays. Each of them, seen by the microscope, represents a large fusiform cellule, colorless by itself, containing two rows of small rounded cellules, dotted and colored violet black, doubtless by the globuline which they contain. The larger cellules are circumscribed on all sides by elongated cellules of the wood, or ligneous fibres possessing the same form, but hollow and transparent, which compose the major part of the wood. They establish a direct communication between the medulla and the bark, that is to say, between the cells constituting the parenchyma or cellular tissue proper; it is from these black points, the seat of an azoted substance, and very apparent upon the polished wood of quassia, that the nitrate of potassa issues, under given circumstances, and which I have not been able to determine, but in producing which, air and light seem to have an important part.

In fact, of twenty goblets of quassia kept during two years in a glazed cupboard, exposed to a diffuse light, and which was frequently opened during the day, only three of them, that had remained uncovered, exhibited upon a portion of their exterior parietes, that upon which most light had fallen, the saline efflorescence in question. All the others, wrapped in a double white paper envelope, exhibited nothing of it. It remains to be determined, if the nitrate of potassa collected upon the quassia, formed part of that pre-existent in the substance of the wood, or whether it be the product of new reactions on the part of the azoted matter and the organic salts with potassa for their basis, which are conjoined with it. This last explanation is, in my opinion, the most plausible.

Ashes of Quassia.

The prescriptions of foreign physicians, rigidly executed, sometimes become the occasion of instructive observations by the apothecary, especially when he manipulates with substances little used in the Materia Medica. Such are the ashes of quassia. These ashes, in the quantity of two drachms to the pint, enter into the composition of a bitter wine, having for its base the wood in substance, and as the menstruum, Madiera wine, (*Formula of a Russian Physician*, 1817.) Without any data as to the quantity of ashes that it could furnish, I burned two kilogrammes of quassia, in small pieces, in a new and close reverbatory furnace. The product of this operation was $\frac{1}{32}$ of ashes, almost as white as pearlashes, which proves that the combustion was complete. The unusual appearance of this product suggested the idea of submitting it to some experiments, into a detail of which I shall not enter, inasmuch as they offer nothing new in an analytical point of view. I shall confine myself to the general results.

The ashes of quassia are bitter alkaline.

Cold water abstracts about twenty-five per cent. of soluble matter, composed of pure potassa, carbonate of potassa, free lime, muriate of soda, nitrate of potassa, and traces of sulphate of the same base.

The seventy-five per cent. of matter insoluble in cold water, still yielded to boiling water a little sulphate of potassa and sulphate of lime; the remainder is composed, for the most part, of subcarbonate of lime, and a little sulphate. What attracted my attention in the composition of quassia ashes, is the small proportion of potassa compared with the enormous quantity of carbonate of lime. There are few examples of vegetable ashes so poor in this alkali. A fact not less remarkable, is the existence of nitrate of potassa, untouched in the midst of a product that has undergone exposure to a red heat. However unusual the fact itself may be, it appears to me worthy of notice, were it only for the purpose of attracting the attention of those who are in the practice of examining

saline bodies. But, for myself, it possesses another interest, viz.: the presence of nitrate of potassa in quassia, which I announced nineteen years ago,* and which has been confirmed by the recent investigations of M. Wiggers.

Spontaneous development of Gas in Wine of Quassia.

No preparation is less determined in its composition, or more variable, than the wine of quassia, directed by the Codex. The Russian Pharmacopœia prescribes from one drachm to four of quassia; M. Alibert two drachms, and the Pharmacopœia of Hanover, (1819,) under the name of vinous tincture of quassia, fixes the quantity of this wood at two ounces to the pint of Malaga wine. That which affords the subject of the present observation, had been prepared from the formula of a physician, in the proportion of two ounces to the pint of the white wine of Chablis. As several patients were using this wine at the same time, the physician desired me to prepare a certain quantity of it. But the formula having been modified afterwards, two bottles remained on hand, which were labelled and preserved in the cellar, where they remained about eighteen months, when I examined their contents. To do this, the bottles, which had been placed on their sides, were removed with caution; the wine was limpid, a light grayish deposit had subsided to the inferior portion. A slight movement detached it in the form of semi-transparent filimentous flocculi. The bottles, unopened, were set by to allow the precipitate to settle and the liquid to become clear, which required but a few hours. I then prepared to decant the wine, but scarcely had I attempted to draw the cork, when it was forced out with violence, and the wine flowed out, effervescing like lively Champagne. Its bitter taste was a little diminished, or rather masked by the carbonic acid gas, and was not unpleasant. Exposed to the air during more than twenty-four hours, it was still gaseous, was neither colored or cloudy, and no saline

* See the article *Amer*, of M. Guersent, in the *Dictionnaire de Medecine*, vol. 20.

deposit was observed in the bottle. The flocculent substance of which we have spoken, when separated by means of a linen strainer, possessed a certain degree of elasticity; it passed from a pale gray to a deep brown upon desiccation in the air. It contracted by heat, like the azoted matter of colombo; it burned with difficulty, exhaling, along with much smoke, an animal odor. This substance, without doubt, appertains to the quassia; for the same wine of Chablis as that which formed the menstruum, preserved in bottles, in an adjoining cellar, with the same exposure, and at the same temperature, remained clear and without any deposit.

A certain analogy of action, if not of composition, is perceived between the azoted matter of quassia and that of the currant, examined by Thenard. Both act as a ferment; there exists, however, no sugar in quassia, which is the case with the currant.

Of the formation of Nitre in the Extract of Quassia, after its preparation.

The efflorescence of nitre observed upon goblets of quassia wood, and the opinion I had formed as to the part the azoted matter performed in the production of this salt, determined me to test with the extract, the combined action of air and humidity during a certain time, in order to determine what influence these two agents possessed over nitrification.

I, therefore, took an ounce of extract, A, recently prepared, of pillular consistence, which I deposited in a china vessel, of the capacity of four ounces, and having a cover. This I deposited in a place constantly dry.

I then took an equal quantity of the same extract, B, which I deposited in a similar vessel, but covered with a piece of fine linen, properly secured. This vessel was placed upon a table, near to, but out of the direct rays of the sun, and in a place where, from evaporation, the air was more or less humid. Along side of it, arranged in the same manner, was placed an ounce of the extract of gentian, C, which, as is known,

contains no nitre. These were thus allowed to remain during a whole year, at the expiration of which the three were examined.

Specimen A, a little dried, had lost twenty-seven grains in weight. Treated three times consecutively, for half an hour, with boiling alcohol at 36°, it furnished eight grains of nitrate of potassa.

Specimen B, very soft, had acquired one drachm and eighteen grains; it was heated in a salt water bath, to bring it as far as practicable to its first consistence, when it was treated as the preceding. It afforded ten and a half grains of nitrate of potassa.

Specimen C, of extract of gentian, had acquired thirty-eight grains. Submitted to the same treatment as the two others, not an atom of nitre could be obtained.

Thus, in the extract B, which had been exposed to a humid atmosphere, the increase in the proportion of nitrate had been two and a half grains in the space of a year; whilst in extract C, which had been placed in the same circumstances, and in which azoted matter does not exist, no nitre was formed. It is difficult, it appears to me, from these results, not to attribute the nitre of new production in the extract of quassia to the azoted matter which it contains.

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ART. VII.—ON QUASSIT. By Mr. Wiggers.

This name has been given by Wiggers to the bitter principle of *Quassia amara* and *excelsa*.

To prepare it, boil quassia in shavings in a sufficient quantity of water, filter the decoction, evaporate it to three-fourths, then mix with it a certain quantity of lime water, with which it should be allowed to remain in contact during a day. The lime separates the pectin and other substances. The solution is next filtered, and evaporated to dryness, and the residue treated with eighty or ninety per cent. of alcohol. By this means the *quassit* is dissolved, as well as a little chloride of sodium, nitrate of potassa, and an organic substance of a brown color. By distillation a crystalline residue is obtained, of a pale yellow color. This residuum must be treated with a mixture of absolute alcohol and ether, until the quassit appears pure. The mixt ethereal solution is finally poured upon a little water, and allowed to evaporate spontaneously. If the substances which ether has separated, are reunited, and they are then treated anew with the mixture of absolute alcohol and ether, more quassit will be obtained.

Quassit presents itself under the form of very small white prisms; it is very little soluble in water, 100 parts dissolve only 0.45 parts of it. The solution of it in water is precipitated by tannic acid, but not by iodine, chlorine, &c. It is very soluble in ether; the best menstruum is alcohol, which acts with power, according to its strength and temperature. All its solutions are colorless. It is a neutral body, for sulphuric and nitric acids dissolve it, but without combining with it. The last is driven off by heat, leaving the quassit untouched. It is composed of

Carbon,	66.912
Hydrogen,	6.827
Oxygen,	26.261

British Ann. of Med., and Journ. de Ch. Med.

ART. VIII.—EXTRACT FROM A PAPER, ON A NEW METHOD OF ANALYSIS FOR THE ESTIMATION OF THE PRINCIPLE CONSTITUENTS OF ORGANIC MATTERS. By M. Persoz.

Having, in a preceding essay, laid down the principle that organic and inorganic combinations are formed by the same laws, it remains for me to verify this, by experimentally studying the proximate composition of organic bodies. As the study of the elementary composition necessarily precedes that of the proximate, there presents a great difficulty in the choice between the different results often afforded by the same substance. Before being discouraged by this, it is necessary to examine whether the methods used are capable of being perfected; and, moreover, what bearing they have upon the general principles of analysis, at the head of which the following should be placed:

In all kinds of analysis, to have sure means at our disposal to verify directly and indirectly the results, and never to permit ourselves to calculate a result by a difference.

Likewise, this:

To estimate the quantity as far as possible while in the gaseous state, and likewise, if we can, to transform a gaseous body into a definite gaseous combination, in which the substance we wish to estimate shall occupy a more considerable volume.

If we are content, as some have been, to decompose a substance by the oxide of copper, to convert it into water and carbonic acid, and having weighed these two compounds to ascertain, on the one part, the quantity of hydrogen, and on the other, the quantity of carbon, to deduct the sum from the weight of the matter employed, for the purpose of obtaining by difference the quantity of oxygen it is supposed to contain, we are really only exact as to the quantity of carbon; for there is nothing to prove that a greater or less quantity of hydrogen does not exist in the substance in the form of water,

or that a part of the water obtained and weighed has not been afforded by the oxide of copper incompletely dried, or by the apparatus itself.

Now, if we have no other means to verify the results obtained by following this method, it is evident, according to this statement, that the method does not satisfy the first principle we have laid down, and which is so well established by experience. Likewise, it loses the advantages which are always found in the application of the second, by causing the operator to make his valuations by weight, instead of measuring the substances in the gaseous state.

Always impressed with the necessity of finding some means to verify the quantity of free hydrogen which may be found in an organic body, I performed, for this purpose, a great number of experiments, the results of which I shall now state.

For example: I had hoped, having first ascertained the quantity of lead obtained by the reduction of litharge, then by means of the weight given to the organic substance, I should know the quantity of reducible matter, from which it would only be necessary to deduct the quantity of carbon, to obtain exactly the weight of the hydrogen. These calculations would be founded on the supposition that 12.48 grains of hydrogen would liberate 1294.50 grains of lead, while 76.44 of carbon would give $1294.50 \times 2 = 2589$ of lead. I had to give up this mode, because, whether the vessels in which the reduction was made were placed in the same or different furnaces, the results were not the same.

I attempted, then, to determine the reducing power of organic matters by mixing them with the sulphate of potassa or baryta, and calcining the mixture in a retort, without contact with the air. During the calcination, the carbon and hydrogen should reduce proportional quantities of the sulphate into sulphuret, quantities which it appeared to me could be ascertained, in the case of the sulphate of potassa, by establishing, by the alcalimeter, the value of the sulphuret formed during calcination, and for the sulphate of baryta; by dissolving the sulphuret, and regenerating the sulphate of baryta by

means of sulphuric acid; but here, also, the inequality of the results caused me to renounce this mode.

I was rather more successful when I employed the oxide of mercury, for, besides the advantage of more easily consuming the organic matter, I found this, likewise—the estimation of the quantity of oxygen furnished by the combustion.

This success not being sufficient to satisfy me, I continued my researches, and was not long in obtaining results which astonished me by their exactness, by employing the sulphate of mercury, which, besides the property it had of consuming the organic matters at a low temperature, afforded, moreover, in the products of its decomposition by the hydrogen and carbon, many means to verify the composition of the organic matters. Thus, in causing two volumes of hydrogen to act on the sulphate of mercury, there was liberated but one volume of sulphurous acid, because, as I convinced myself, the reduction of the acid and the base took place simultaneously; and two volumes of hydrogen absorbing but one of oxygen, it follows that there could have been but a half volume of oxygen taken from the sulphuric acid, and, consequently, but one volume of sulphurous acid disengaged. One atom of carbon requiring two atoms of oxygen for its conversion into carbonic acid, and acting simultaneously with the hydrogen upon the base and acid, would take from the sulphuric acid one volume of oxygen, and liberate two volumes of sulphurous acid; that is to say, a quantity equal to that of the carbonic acid.

From the facts, we may make the following deductions:

1. That from every organic substance, which consists of carbon, together with oxygen and hydrogen in the proportion to form water, there will be disengaged equal volumes of carbonic and sulphurous acids.

2. That from a substance formed of carbon and oxygen, carbonic and sulphuric acids will be produced; that the volume of the first will exceed that of the sulphurous acid; and, finally, that the difference will represent the volume of oxygen which exists in the matter.

3. Likewise, from another substance constituted of carbon, with oxygen and hydrogen in the proportion to form water, together with an excess of hydrogen, there will be formed equal volumes of carbonic and sulphurous acids, together with an excess of sulphurous acid, the volume of which being multiplied by two, will give the volume of hydrogen which is in excess in the substance.

4. In substances containing azote, the same phenomena will take place as in the three preceeding cases, except that a quantity of azote will be set free, of which the relation with the sulphurous and carbonic acids will be constant throughout the whole operation.

Hoping to have found a mode to fulfil the two conditions, which appeared essential to the exact analysis of organic substances, in affording the means to verify the results, as well as to estimate the body in the gaseous state, and with as little chance of error, as that each volume of sulphurous acid should double the volume of carbonic acid, there remains but to give the details of the operation itself, which is divided into two parts, the combustion of the organic matter by the sulphate of mercury, and the analysis of the gas resulting from the decomposition.

To give an idea of the facility with which analysis, by this new method, may be performed, it will suffice to say, that with the assistance of one person to dry the receivers, and to procure the necessary charcoal, I can conduct two operations at the same time, and finish them in an hour and a half. As to the precision of the results, they are not less astonishing, for they are such, that when all the precautions pointed out are taken, we are more sure to obtain the same numbers in repeated experiments on the same substance, than we are in the analysis of air by the different methods applied to that fluid.

Likewise, it renders us able to follow the changes in the dry distillation of organic matters, when by their nature they can afford hydrogenated products; which products, by an arrangement of the apparatus, so that they shall pass through a

tube filled with sulphate of mercury properly heated, will yield sulphurous and carbonic acids, of which the proportions, should there be any change in them, will correspond with the, different products which have been formed during the distillation.

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ART. IX.—NOTE ON THE BARK OF THE BE-LAHE, OR COSTUS AMER. By M. Guibourt.

A resident of the Isle of Bourbon sent to Paris a certain quantity of bark, much used as *anti-dysenteric* in that island, whither it is brought from Madagascar. This substance having been presented to me, I recognised it as the bark of the belaaye, or rather, *be-lahe*, coming, in fact, from Madagascar; and, moreover, I assured myself of its identity with a bark which a long time ago I found in commerce, under the name of *Costus amer*,—an inconvenient name, but one I was obliged to adopt for want of a better. So, the bark to be found described in the *Histoire Abrigee des Drogues Simple*, under the name of *Costus amer*, is the bark of the *be-lahe* of Sonnerat, Maudyt, and Murray.

This bark, such as I received it, is in large cylindrical rolls, quite light and thin, and of a grained, rather than fibrous, fracture.

The epidermis is often thin, grayish, marked with large spots, and at other times white and spongy. The internal surface is as if coated with a pellicle of a somewhat fibrous appearance, and deeper in color than the substance of the bark itself, which is of a clear yellow. Its taste, but little sensible at first, becomes extremely bitter by mastication, accompanied with a nauseous taste. The aqueous maceration is bitter, and presents the same properties as that of the *Costus amer*.

The true name, *be-lahe*, is yet little known. All that is known of its botanic character is, that it has alternate and trifoliate leaves; that it is dioicious, and its male flowers have five stamens. It is not known upon what reason it is stated, in the *Journal de Pharmacie*, vol. xvi., p. 137, that the be-lahe is the *Mussænda stadmanni*, a tree of the family Rubiaceæ, with opposite leaves and hermaphrodite flowers. The author of that article had previously, and with little reason, assimilated the *be-lahe* with the *Nerium anti-dysentricum*, or *codagaphala* of India.—*Bulletin de Pharmacie*, vol. vi. p. 255.

The bark of the *be-lahe* is used in Madagascar to give bitterness to a kind of beer made with sugar cane. In the Isle of Bourbon they employ it successfully in diarrhœa and dysentery. Sonnerat tried it upon himself with success. The dose is from twenty-four to thirty-six grains in an infusion of tea, or in wine.

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ART. X.—NOTE UPON THE PREPARATION OF SIMPLE PLASTER. By M. Beral, Pharmacien.

Process communicated to the Society of Pharmacy of Paris, by M. A. Gelis:

Take of white Marseilles soap,	4 lbs.
Water,	8 lbs.
Dissolve by heat, and add to the solution crystallized acetate of lead,	2 lbs.

Stir the mixture gently with a wooden spatula, until the liquid becomes transparent. Decant, wash the plaster with a fresh portion of water, and when conveniently cooled, malaxate it by small quantities, to separate the water it contains. The

product will be four pounds. In following exactly this formula, a very white plaster is obtained, but of a consistence too hard. Messrs. Chevallier, Lecanea, and Boudit announced the chemical proportions of this stearate to be about the same as that in the Codex, and not dearer.

Additional Plaster.

Take of plaster as above,	4 lbs.
Fatty acid, separated from soap,	8 oz.

Melt and mix exactly.

This addition, which has been recommended by M. Gelis, seems to have for its object, the giving to the plaster obtained by double decomposition the consistence and malleableness of the common plaster.

Fatty Acid.

Take of white Marseilles soap,	16 oz.
Water,	32 oz.

Dissolve and decompose the soap by the following mixture:

Sulphuric acid,	2 oz.
Water,	16 oz.

Observations.—The mode proposed by M. Gelis for the preparation of simple plaster, is distinguished from the ordinary process, not only by an easier and more certain execution, but likewise by the nature of the product, which is always identical and of greater whiteness.

These facts, the merits of which we have not heard contested through any scientific report, do not appear to us sufficient for the definite adoption of M. Gelis's process in practice. This may be judged by the following:

This process, though more prompt than the old one, when operating in a small way, requires, on the contrary, longer time when treating twenty or twenty-five pounds of soap at once. This circumstance depends altogether upon the large

quantity of water which the plaster retains between its particles, and which, to be separated, exacts a long and troublesome manipulation.

In following the ancient method, it is possible to conduct the operation in a way that the water necessary to the boiling be entirely evaporated when the plaster is finished.

By this means ulterior labor is much shortened, which, much as it may be necessary, ought to be taken into consideration, since it is indispensable.

The solution of soap, even increasing the quantity of water prescribed, requires more time than is generally thought. The plaster prepared by double decomposition, is so friable that it cannot be employed alone for medicinal uses. This inconvenience you cannot avoid, either by substituting subacetate of lead for sacch. saturni, or by replacing the Marseilles soap by animal soap.

The plaster of M. Gelis's process being harder than the ordinary one, it is natural to suppose that the mixtures, into which it is introduced, will also be of greater consistence. It is, however, certain that, by the addition of resins to this plaster, an inverse result is obtained; and even when the consistence is finally analogous, it is a longer time in manifesting itself; it is this which constitutes an inconvenience in the preparation of *sparadrops*, (adhesive plaster spread upon linen,) when they contain a noted quantity of resin.

It is known that ether dissolves the stearate of lead. It would be well to observe whether the resins enjoy the same property by heat. It is, probably, the reason that a mixture composed of a brittle plaster and a friable resin, is always more or less soft.

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ART. XI.—EXTRACT FROM A PAPER ON PHLORIDZINE.

By T. Boullier.

The author having, in the medical practice of his vicinity, perceived great advantages from phloridzine employed as a febrifuge, compared with the sulphate of quinine, has been occupied with the means of obtaining easily this medicine in a state of purity. The following is the method he directs:

Having procured living roots of the apple tree, recently taken from the ground, the bark is to be stripped off and placed in a basin of copper, and sufficient water poured upon it to cover it entirely. It is to be then boiled, taking care to add, from time to time, enough water to replace that which evaporates; after four hour's boiling, the liquid is to be decanted, and the same quantity of water, as at first, is to be added to the residue, which, having boiled for an hour only, is to be decanted. These two products, separated and placed at rest during thirty hours, will deposit at the bottom of the vessel a large quantity of phloridzine, resembling deep red velvet.

It is necessary, for the second decoction, to divide the bark while yet hot, and to beat it in a marble mortar.

All the phloridzine being put together, half its weight of animal charcoal is to be added; and, after having been boiled in a suitable quantity of water for some minutes, it is to be filtered. It must be thus purified three times, and the last time received in a vessel previously heated by boiling water, so as to obtain by slow cooling a handsome crystallization, which takes place at the end of some hours.

The whole is to be poured upon a sheet of paper, stretched upon a cloth to filter, and allowed to dry at the common temperature.

Phloridzine is a light substance of great whiteness, crystallized in handsome silky needles, without action on test paper, or upon the syrup of violets; its taste is slightly bitter, but not followed by any astringency.

At common temperatures, it is but slightly soluble in water; it requires 1016 parts of that liquid to dissolve one part of phloridzine.

At 100°, water dissolves its own weight; the solution is bottle green, but on cooling assumes a dull white color and becomes a solid mass.

Water, acidulated with sulphuric, nitric, or hydrochloric acids, dissolves very little phloridzine, but it becomes very soluble on the addition of a few drops of solution of ammonia. At the end of twenty-four hours these solutions are of a deep yellow, and it is not possible to discover any trace of phloridzine.

Alcohol at common temperatures dissolves one half its weight, and then, by agitation, forms bubbles like soapy water.

If we pour this solution, drop by drop, into water, the phloridzine forms a flocculent precipitate, and to obtain it in the crystalline form, must be redissolved and allowed to cool slowly.

At the boiling temperature, alcohol dissolves it in every proportion.

It is almost insoluble in sulphuric ether, either cold or boiling; it is very soluble in sulphuric acid of commerce; weak nitric acid likewise dissolves it, and becomes of a yellow color; weak hydrochloric acid dissolves it very slowly.

Treated with half its weight of nitric acid, and a suitable quantity of water, its properties are totally changed; after an hour's boiling the liquid became of a rose color; after twenty-four hours of rest, it was a deep red. There was not found either on the bottom or sides of the vessel, any trace of phloridzine, and the author in vain endeavored to precipitate it by an alkali.

Solution of ammonia dissolves phloridzine without alteration, and communicates to it a yellow color.

Potassa and soda dissolve it with the same readiness, but the solutions are without color.

A single drop of ammonia in an ounce of distilled water, is

sufficient to dissolve a great quantity of phloridzine. The author has endeavored to drive off this alkali by heat, in the hopes of forming a precipitate, but the liquid becomes colored without abandoning the phloridzine.

Any acid precipates it by saturating the base.*

Possessing a large quantity of phloridzine, M. Boullier has placed it in the hands of many practitioners, and its use has always been followed by the most happy success. Encouraged by such good results, he wished to extract it from the bark of the cherry tree root, in hopes to be able to offer it at the lowest price in commerce, but it was impossible to obtain the least trace of it, either by means of an aqueous decoction, or by an alcoholic infusion; after thirty-six hours rest he found nothing, either on the bottom or sides of the vessel, but a very bitter resin. Meanwhile, notwithstanding the difficulty of procuring apple trees in full vigor, phloridzine will not be the less, says the author, employed hereafter by all the physicians; for its highly energetic properties, as well as its easy administration, will assure it the first rank among febrifuges.

ADDITIONAL NOTE ON PHLORIDZINE. By T. Boullier.

Since preparing the paper upon phloridzine, which I have sent to the Society of Medical Chemistry, I have applied myself anew to the extraction of this substance. Up to the present time, I have submitted the bark to two decoctions; the first of four, and the second of two hours only; but, convinced of the entire solubility of phloridzine in boiling water, I have thought so long a boiling was not necessary; that it was possible it

* From these two last facts it would appear conclusive that phloridzine plays the part of an acid; at least, that it is not altered by the hydrated alkalies, as occurs in the case of daturine, hyosciamine, atrophine, and likewise in amydine. This will be a new object of research, which may lead to interesting results for science in general, and in particular for the history of phloridzine.

might destroy part of the product, and that it would color it. In consequence, I made many trials, and the results have demonstrated that the following process was the one to which preference should be given.

It consists—1. In submitting the same bark to two decoctions, of but half an hour only. We obtain then a quantity of phloridzine as abundant, much less colored, besides more easy to purify, and with a saving of fuel and time, since one hour is sufficient in the place of six.

2. To evaporate the mother waters to two-thirds. It lets fall, at the end of twenty-four hours, a greater quantity of phloridzine than the first decoction, but more colored.

These two observations not having as yet been announced, and offering great advantages, I thought it might be useful to give them publicity.

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ART. XII.—ON CETRARINE. By Dr. Herberger.

Cetrarine, or the bitter principle of *Lichen islandicus* which M. Herberger has been the first to obtain in a pure state, is prepared in the following manner. The *Lichen islandicus*, in coarse powder, is to be boiled for half an hour in four times its weight of alcohol, of .883; the whole is to be left at rest until the extrication of vapors cease, to prevent the loss of alcohol. When they have ceased, the liquor is to be expressed, and diluted hydrochloric acid added, (three drachms to every pound of lichen.) There is then to be mixed with the liquid four and a quarter to four and a half times its bulk of water, and the mixture left for one night in a matrass, which is to be closed. The following day, the yellow wine colored liquor, which swims over an abundant deposit, is to be decanted, and the deposit, which is of a color

more or less green, is to be thrown on a filter, and having been allowed to drain as little as possible, is to be pressed. To purify it, immediately after it is taken from the press, while yet moist, it is to be divided into small fragments, and in this state to be washed with alcohol or ether. It is then to be treated with two hundred times its weight of boiling alcohol, in which the organic matter, which has hitherto accompanied it, is scarcely soluble. The greater part of the cetrarine precipitates gradually by the cooling of the alcoholic liquor; and by driving off the alcohol, the remainder may be obtained.

Pure cetrarine is sometimes an absolutely white powder, like magnesia; sometimes in the form of small globules united together in perfect tree-like forms, in which, however, M. Herberger could, by means of a microscope, perceive a crystalline texture. Slightly compressed, it presents a little silky lustre. It is light, unalterable in the air, inodorous; the bitterness is quick and very intense, especially when dissolved in alcohol. When left for sometime in water, it falls to the bottom of that liquid; it is imperfectly fusible; at the temperature of 125° C., it becomes brown; at a still higher temperature it gives off an acid oil of a reddish yellow color, which congeals on cooling; it blackens at 160° C., and leaves behind a large quantity of spongy charcoal, which burns freely in the open air.

Its best solvent is absolute alcohol; 100 parts dissolves 1.70 at the boiling temperature, but only 0.28 at 14° C. Alcohol of 0.83 dissolves 0.44 while boiling, 0.28 at 25° C., and only 0.04 at 14° C. It is less soluble in either boiling or cold water, in the essential oils, kreosote, &c. It is more so in acetic ether, and above all in sulphuric ether, of which 100 parts dissolve 0.93 at the boiling temperature, and 0.57 at 14° C. It is insoluble in the fatty oils. Finally, all its solutions when tried by test papers appeared neutral.

The action of the acids on cetrarine varied with their nature and degree of dilution. All the weak acids, the mineral as well as the organic acids, precipitate it from its solutions in the

flocculent, and sometimes gelatinous form; however, the precipitation is not complete, and by evaporation a small quantity of cetrarine can always be obtained.

Dry cetrarine is, on the contrary, changed to a yellow and then to a brown color, by concentrated sulphuric acid. It then forms a brownish red, afterwards a vinous blood red solution entirely precipitable by water. The precipitate formed by this last mode, presents all the properties of ulmine. Concentrated nitric acid converts it into a yellowish brown resin and oxalic acid, giving off, at the same time, nitric oxide. Phosphoric acid changes it gradually, by the aid of heat, into ulmine.

The action of hydrochloric acid on cetrarine is altogether interesting, changing it, especially if assisted by a gentle heat, into a blue colored matter, which dries in the light into a bright blue mass, but which in water or weak acids takes a less deep tint. This matter is but slightly soluble in water, alcohol, &c., and has, moreover, a bitter taste; the alkalies change it very promptly into ulmine. It dissolves in concencentrated sulphuric acid, to which it communicates a deep blood red color; colorless concentrated nitric acid produces, with it, a solution of a beautiful color, which varies from a rose to a carmine red. It dissolves with a yellow color in nitric acid in excess, and if water has been added, at the beginning, to this solution, or rather to that by sulphuric acid, the coloring matter may be reproduced without alteration.

This blue of cetrarine is not formed when dry hydrochloric acid gas is passed upon cetrarine, or when this latter is heated in an atmosphere of the gas. At common temperatures cetrarine does not absorb the gas at all; and when heat is applied, absorbs it but imperfectly, becomes brown, and carbonises, giving rise to hydrocarburet of chlorine, and the volatilization of an orange red liquid, and a semi-solid mass of a fine carmine red.

Tannic and gallic acid cause no sensible change in solutions of cetrarine.

Cetrarine unites in fixed proportions with the alkalies and alkaline earths, without destroying their reaction on vegetable

colors. It belongs, therefore, to the electro-negative organic substances. Alcaline solutions dissolve cetrarine with great facility, but these combinations have great tendency to change into ulmates; thus, the best means to obtain them pure, is to dissolve as much cetrarine as possible in a very weak alkaline solution, and add afterwards an acid, the acetic acid especially, until the liquid becomes slightly acid. The ammoniacal salt, especially, is obtained very easily in this manner. It is yellow and almost crystalline in appearance. By repeated solutions in boiling alcohol, &c., it may be procured in the greatest purity.

Cetrarine and its combinations, analogous to salts, precipitate the salts of iron, of a red color; those of copper, green; those of lead and silver, white. Its alcoholic solution is precipitated, more or less promptly, and more or less copiously, by arsenious acid, the salts of cobalt, nickel, zinc, cadmium, the protoxides of mercury, and of manganese. The salts of the deutoxide of mercury, the cyanide, and the cyanide of potassium, &c., have no sensible action upon it. It precipitates black the solution of gold, and lilac that of platinum, but only at the end of some hours.

It produces no change in alcoholic solutions of the organic bases. Dried in the apparatus of M. Liebig, the combination of cetrarine with oxide of lead, free from carbonic acid, does not lose any weight; cetrarine is, therefore, anhydrous.

0.166 grains of the combination of cetrarine and the oxide of silver, perfectly dry, gave 0.0160 of silver, 0.200 grains gave 0.0194; this combination, therefore, consists of—

			Expt. 1.	*Expt.* 2.
1 Arg.	1451.607	10.3888	10.3516	10.4176
1 Cetr.	12521.073	89.6112	89.6484	89.5824
1 Arg. cetr.	13972.680	100.	100.	100.

According to these numbers the capacity of saturation is but 0.798, and if the combination of cetrarine with oxide of silver can in fact be considered as neutral, this substance will

have the greatest atomic weight of all the organic matters known at the present time.

Dr. Muller, of Kaisersluntern, has already employed with success, the cetrarine in one case of quartan, and in another of tertian intermittent fever.

The following is the formula:

℞.	Cetrar.	
	Gumm. Arab. $\overline{aa}$,	gr. ij.
	Sacch. alb.	ʒ ss.
	M. F. pulv. D. tal. dos.	viii.

Take one dose every two hours during the apyrexia.

This substance appeared to him to act with more slowness than quinine, but to have this advantage, not to affect the stomach. Its price should be much less than quinine, since M. Herberger has been able to obtain from one pound of the lichen, 135 grains of very pure cetrarine. Salacine, as is known, is given in much greater doses.

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ART. XIII.—OBSERVATIONS ON THE PROCESS OF JAMES MARSH, FOR THE SEPARATION OF SMALL QUANTITIES OF ARSENIC FROM MIXTURES CONTAINING IT.

M.M. F. Mohr and J. Liebig, the editors of the Annales de Pharmacie, have repeated the process of Mr. Marsh, and have obtained results similar to those announced by that chemist. The following are their observations on this important subject.

OBSERVATIONS OF M. MOHR.

The method pointed out by Mr. Marsh to separate at once arsenic, in the metallic state, from liquids, is completely established; and, in fact, is too surprising not to deserve con-

firmation by other observers. The experiments which he describes, have been repeated with every possible care, and found completely exact. I will now give the additional observations which I have made on this subject:

1. I produced a strong extrication of hydrogen gas from perfectly pure materials, by placing some turnings of zinc in a glass tumbler, pouring upon them some acid, and inverting over them a funnel with a very fine extremity. The gas, when ignited, afforded a brilliant flame, totally colorless, and gave no stain to a porcelain cup held over it. Without extinguishing the flame, I added to the liquor a few drops of a very weak solution of arsenious acid in hydrochloric acid; immediately the flame became a light blue; on this change taking place, thick vapors of arsenious acid were given off, and a porcelain cup held over the flame was covered with a strong film of arsenic, so that it was only necessary to move the porcelain cup, to blacken, in the space of a few seconds, a space as large as the hand. If the quantity of acid is considerable, as, for example, the one thousandth of the liquor, all the flame is of a light blue, and if it be directed for a long time upon the same part of the porcelain, the film of arsenic becomes so thick that it curls up and detatches itself.

2. The liquor was then decanted; the turnings of zinc were washed with an abundance of water, and moistened with a fresh portion of pure acid, in the same apparatus. The inflamed gas again burnt with a blue flame, and exhibited the presence of a notable quantity of arsenic. This presence was again very apparent, even after pouring upon it once more some pure acid; and it results from this that, *in these researches, we must employ zinc which has never before been used for a similar purpose.*

3. Of all the modes of detecting the arsenic in the flame, that of placing above it a piece of porcelain, or a tile from a Dutch stove, certainly deserves the preference; it is better than the use of glass or mica; as these, on account of their transparency, do not permit us to recognise very delicate shades, which are set off very strongly by a white ground.

4. If the arsenic be diminished, and does not represent more than the one-eight or ten thousandth of the liquor, the whole of the flame is not colored, but only its point. The lower three-fourths resemble the flame of pure hydrogen, while the point is tinged greenish yellow, and is opaque. If the porcelain be held in the bright part of the flame, the cooled arsenic becomes attached to it. It is hardly necessary to say, that this combustion is altogether analogous to that of olefiant gas, in which the separated carbon burns immediately at the circumference, or may be obtained in the state of lamp black by the aid of a cold body. The arsenic burns in a like manner when not collected, and is changed into arsenious acid, which is likewise deposited at the edges of the arsenical film.

The change of color is so marked, that, having once observed it, we may recognise immediately, by the inspection of the flame, the presence of arsenic, and afterwards find a confirmation by the use of the porcelain tile.

5. The arsenic acid is reduced in the same manner as the arsenious; and the same may naturally be said of the arseniates. A very small particle of arseniate of soda, held in the flame of hydrogen obtained from perfectly pure materials, instantly produced a light blue flame and a black film.

6. Pure zinc, boiled with an aqueous solution of arsenious acid, becomes covered with brown spots, and finally with a thin film of metallic arsenic, the color of which becomes deeper and deeper. These particles of zinc, washed with pure water and placed in hydrochloric acid, likewise pure, produce an arsenical flame. This experiment explains readily why we cannot employ the zinc a second time in similar examinations.

7. Arsenic acid and zinc disengage immediately arsenuretted hydrogen, and the zinc becomes covered with a black pulverulent film, which is easily scraped off and which contains arsenic.

8. I have made different experiments for the purpose of graduating the degree of sensibility of this reaction. Ten

grains of pure arsenious acid were dissolved in carbonate of potassa, and diluted with water, until the mixture made ten drachms, so that each drachm contained one grain of arsenious acid.

a. One drachm of this solution, and consequently one grain of arsenious acid, diluted with six ounces of water, (constituting $\frac{1}{2880}$ parts,) gave a flame altogether blue, and a very strong film of metal.

b. One half of a grain of arsenious acid, in eight ounces of weak acid, ($\frac{1}{7680}$ parts,) gave a flame slightly blue, but nevertheless a strong film upon the porcelain.

c. One drachm of the preceding liquor was diluted with water until the mixture weighed two ounces. To one drachm of this (consequently $\frac{1}{16}$ of a grain of arsenic,) four ounces of weak acid were added, ($\frac{1}{30720}$ parts,) and it still gave a flame visibly blue, and a film of arsenic sufficiently well marked.

d. One-half of a drachm of the preceding liquor (8.), which contained consequently one-half of a grain of arsenious acid, was diluted with two pounds of water, and one ounce of hydrochloric acid, added to this liquor (thus constituting no more than $\frac{1}{480000}$ parts;) from this I obtained an evident grayish black film, and in as many spots as I wished.

e. One drachm of this weakened liquor, (*d.*), increased by sufficient weak acid to form two ounces, (thus forming but $\frac{1}{491520}$ part,) exhibited on a brilliant white enamel, a yellow spot although not recognisable in the gas. By directing for a long time the flame upon the same place, the bright yellow became a little deeper, and then changed immediately to a deep gray.

A dilution of 500.000 times appears to be the limit of certainty in the reaction by this method, and, in fact, this sensibility is so enormous that we ought to use great care lest we be misled by any residue from a former experiment; new portions of zinc should be used for every trial; the vessels should be washed with the greatest possible care; and the experiments should be made with materials perfectly pure, to assure the exactness of the results. The sulphuric

and hydrochloric acids, together with the zinc used, were perfectly free from arsenic.

The method of Mr. Marsh constitutes an epoch in the history of examinations for arsenic, and renders all other means superfluous. We possess a sufficient number of proceedings to extract arsenic in a metallic state from its combinations, a proof that we have isolated it, but it is precisely here that the difficulty lies. The boiling of the stomach and intestines, frequently half putrid, a long filtration of the liquors, the separation of the precipitated sulphuret of arsenic, rendered often impossible by the viscosity of the liquid, and then the final treatment of the precipitate mixed with animal substances; all these inconveniences disappear. We place the suspected matters in a common glass flask, add hydrochloric acid, and heat for some time to dissolve the solid combinations of the arsenic, add some pieces of zinc, inflame the gas, and thus obtain, in a short time, a result equally as positive as we can obtain by any other method in trials of a week. Is it necessary to state that, to prevent explosion, we should not loose sight of the well known precautions? But as it is important to be able to inflame the gas promptly, the vessel should be filled as full as convenient with the liquid when the disengagement takes place.

The two most certain indications of arsenic, the presence of a volatile metal of a particular aspect, and peculiar smell, are exhibited and bring the most perfect conviction.

We must not confound the film of arsenic with the little black points and spots which are deposited on the porcelain, during the rapid solution of iron and other metals in the acids.

This method is likewise applicable to the discovery of arsenic in solid substances. We then endeavor to bring them to the state of solution, avoiding, however, any disengagement of hydrogen.

Antimony and its sulphuret are, in the first place, oxidized by nitric acid, the liquid decanted, and heated with hydrochloric acid, until all the nitric acid is destroyed; and then

poured into an apparatus where there should be already a strong disengagement of hydrogen. The result will be immediately apparent.

OBSERVATIONS OF M. LIEBIG.

The sensibility of the method pointed out, for the discovery of arsenic in a liquid which contains it in the state of arsenious acid, almost surpasses imagination. The flame of hydrogen gas disengaged from zinc and hydrochloric acid, to which there has been added 0077 of a grain of arsenious acid, will cover, upon a fair and bright plate of porcelain, a surface of half an inch square with a black glistening metallic film of arsenic.

We may, however, be exposed to extremely fatal mistakes, when the liquid upon which we make our researches contains foreign metals. If, for example, we dissolve pure iron in hydrochloric acid, and direct the flame of the disengaged hydrogen gas upon a porcelain surface, this will always be covered with a strong black film, which we are liable to take for arsenic, but which is nothing else but metallic iron. In fact, the gas, while passing off, carries with it some extremely fine drops of the solution, and the chloride contained in it is reduced by the flame; the metallic iron deposited on the porcelain, burns at the edges of the flame, and is changed into oxide; the film of arsenic, moreover, is distinguished easily; it disappears immediately when moistened with a drop of nitric acid, or hydrosulphate of ammonia, while that of iron is not attacked by the acid, and is colored greenish black by the hydrosulphate. This phenomenon is manifest, likewise, when we pass the gas through a large glass tube, a foot in length, and filled with hydrate of potassa in large fragments. The proof is rather more certain when we pass the gas through a long tube filled with cotton slightly pressed. All the heavy metals, and among the rest antimony especially, act like iron when they are mixed with the solutions.

The method of Mr. Marsh presents complete certainty

when we pass the hydrogen gas, liberated from a liquid containing arsenic, through a tube, one line in width, and of glass difficult of fusion, heated to a redness by means of a spirit lamp, for a space of two inches from the orifice, where the gas is disengaged; we will then see all the arsenic deposited in the form of a bright black metallic ring, beyond the red part of the tube. It is not necessary to hurry the disengagement of the gas, as we would under other circumstances, to give a certain size to the flame of the gas; on the contrary, it is preferable that it should form as slowly as possible. We have then a particular advantage, that the particles of foreign metals carried off shall be reduced in the red part, or be disposed in the form of black rings, which cannot be driven from place to place, like arsenic, by a low red heat.

I made some experiments to reduce in a similar manner the sulphuret of arsenic, and obtained very satisfactory results. All chemists agree, that arsenic is separated with more certainty and completeness from an acid liquid, by means of sulphuretted hydrogen, since we cannot always, by the method of Rose, prevent the formation of ammonia during the boiling of the animal matters. On saturating the alkali with hydrochloric acid, a salt of ammonia is always formed, which hinders, as is known, the precipitation of the arseniate of lime. When we have obtained, by the method of Berzelius, a sulphuretted precipitate from a similar liquid, the solution of the question then consists in disengaging the arsenic with all its properties.

If we dissolve this precipitate in a solution of potassa, and add to the liquor acetate of lead, taking care that the alkali shall remain in excess, the sulphur of the sulphuret of arsenic will unite with the lead, and all the arsenic will be found in the solution in the state of arsenious acid. The salt of lead should be added until the liquid no longer gives any precipitate with acetic acid; that is, until the sulphuret of arsenic has undergone the decomposition pointed out above. If we now add to this liquor, without separating the sulphuret of lead, an excess of weak sulphuric acid, and place in it a piece of zinc,

and pass the disengaged hydrogen through a narrow glass tube, heated to redness in one place, the characteristic film of arsenic under the form of a black metallic ring, will not fail to appear in the cold part of the tube. This trial gives a positive result with .0077 of a grain of sulphuret of arsenic. Besides, by this process, there always remains united to the zinc, a certain quantity of arsenic which naturally escapes this reaction. I believe that I can recommend, in the majority of cases, the following method as quite certain, according to the results which I have obtained. Dissolve the sulphuretted precipitate in a solution of potassa, (if the quantity is so small that the sulphuret cannot be detached from the filter, it is to be moistened with the solution of potassa,) and add to this solution nitrate of silver, until a single drop of the liquid will not give a yellow precipitate with acetic acid; the potassa should always be in excess in the liquid. The insoluble sulphuret of silver is thus formed, while the arsenic remains in solution in the state of arseniate of potassa; hydrochloric acid is to be added to this liquid in a slight excess, and the sulphuret and chloride of silver separated by a filter; then heat to boiling to separate free carbonic acid, and saturate with lime water. The precipitate formed, is the arseniate of lime. This having been carefully dried, is mixed with powdered charcoal, heated to redness, and reduced by the known method.

In place of precipitating the slightly acid liquor by lime water, it may be evaporated to dryness by a salt water bath, the residue mixed with charcoal, and the arsenic obtained by a red heat. Instead of using nitrate of silver, we may employ the nitrate of copper with the same result; only we should then, before saturating with hydrochloric acid, separate the sulphuret and oxide of copper by the filter.

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ART. XIV.—ON THE PRESENCE OF TIN IN THE PROTOSULPHATE OF IRON, AND THE INCONVENIENCES THEREFROM IN EXAMINANATIONS FOR ARSENIC. By M. Sarzeau, of Rennes.

The presence of a small quantity of tin in the protosulphate of iron is a fact, in a chemical point of view, of but small importance, but the circumstances accompanying its discovery, appears to me to give it some consequence in legal medicine. I publish this note for the purpose of removing one of the causes of doubt and difficulty which are so troublesome in judicial investigations.

Towards the end of June, my assistance was required in a case of poisoning by arsenic; the patient had been treated by the hydrate of the peroxide of iron. Among the substances for examination, were the matters vomited. These were not abundant, and contained bread, curdled milk, &c. Having been rubbed up in a glass mortar to obtain a very fine pulp, they were diluted with distilled water, and submitted to the action of a stream of chlorine until deprived of color, and perfectly saturated. In this state the liquid was left for some hours in a closed flask; shaking it occasionally, and then filtered. The filtered liquid was boiled to drive off the excess of chlorine; it was acid. Tested with ammoniacal sulphate of copper, it gave a precipitate which, even after frequent washings, retained a color sensibly green. Treated by a stream of sulphuretted hydrogen, it soon became yellow, and deposited a fine yellow precipitate. This precipitate was soluble in ammonia, from which it could be precipitated by acids. As all these reactions tended to prove the presence of arsenic, the sulphuret was dried at the temperature of boiling water, and submitted to the following trials:

1. A part was triturated in an agate mortar, with recently prepared quick lime; this mixture was introduced into a tube closed at one end, and heated; at first with care, afterwards the temperature was gradually increased until the tube be-

came soft and deformed. No sublimation took place, the sides of the tube remaining clear.

2. Another portion was placed by itself in another tube, and heated; a yellow sublimate appeared, and a black, half melted mass could be seen at the bottom of the tube. The tube having been cut, the sublimate was detached; this, when burnt, gave a strong odor of sulphurous acid; treated by ammonia, it yielded nothing to it; it was sulphur.

3. The black, half fused mass of the preceding experiment was pulverized, mixed with subcarbonate of soda, and heated by charcoal to the complete absorption of the alkali. On examining the spot produced by this trial, white metallic globules could be perceived. This spot separated, ground, and washed in an agate mortar, left metallic spangles of a bright silver white, which were perceived to be tin.

These experiments prove how indispensably necessary it is in medico-legal inquiries, always to obtain the poison in a pure state, and then by verifying its properties, to acquire a firm conviction. In fact, had I been content with the effect produced by the ammoniacal sulphate of copper, and the properties of the sulphuret, the conclusion would have been, that the matters vomited contained arsenic. Although the color of the sulphurets of tin and arsenic, and their solubility in ammonia, are not exactly the same, they, nevertheless, are so analogous, that, in experimenting with small quantities, it is difficult to detect their differences.

Cause of the presence of Tin.

It was presumable that the tin was derived from the vessels used in the preparation of the food, but the information obtained from the patient went to show that this could not be the case. Some of the hydrate of the peroxide of iron yet remaining, it was desired that a specimen should be procured of the same sulphate of iron which had been used in its preparation. This salt was labelled, "Pure Sulphate of Iron;" it came from one of the best manufacturers of chemicals in Paris.

Having washed the hydrate in distilled water, it was dissolved in hydrochloric acid, and the liquid treated by a current of sulphuretted hydrogen; a yellowish brown precipitate was formed, which, when washed and dried, yielded, by the aid of heat, metallic tin.

One hundred and twenty drachms of the salt yielded .0285 of a drachm of dry sulphuret of tin, or about two ten-thousandth parts of tin in a pound of sulphate of iron. The presence of tin in this product might have been accidental; but another specimen, likewise labelled pure sulphate of iron, and which came from another manufactory of chemicals, having yielded it, I procured various commercial specimens. The precipitates obtained by means of sulphuretted hydrogen, in their filtered solutions varied singularly in color and composition. When the salt contained much peroxide, the precipitate was loaded with a great quantity of sulphur; having been filtered, washed, and dried, it was introduced into a tube closed at one end and heated, to volatilize the sulphur. The sulphuret which remained, treated with charcoal and soda, aided by heat, gave immediately metallic globules. This metal was sometimes of a bright silver white, more frequently it had a red reflection, and sometimes the color of copper. Nevertheless, an examination of this last, by solution, &c. always proved the presence of tin. It is thus easy to conceive, that in this last case we ought always to find tin in the hydrate, since during its preparation copper would remain in the solution.

The influence of Tin in the determination of small quantities of Arsenic.

If we dissolve by heat 995 parts of good tin in hydrochloric acid, mixed with a little nitric acid, and add to it five parts of arsenic and then boil, we will have a liquid from which it is not possible, by ordinary means, to obtain metallic arsenic.

A solution, containing 990 of tin, to ten of arsenic, fur-

nishes, with sulphuretted hydrogen, a precipitate from which metallic arsenic can be obtained.

Tin then can disguise a small quantity of this poisonous metal.

The peroxide of iron is administered in large doses. Suppose that the sulphate of iron should be sufficient to introduce two decigrams of tin into the stomach, the arsenic, not to be detected, must exist in the proportion of a milligram, and sometimes this quantity, however small, is sufficient to establish a firm conviction. Suppose, likewise, that a chemist, not anticipating this, should meet on the one hand a trace of arsenic, and on the other a large quantity of tin, he would be much embarrassed. Could he affirm that the arsenic had been given as a poison? Does he not know that tin always contains traces of it? He cannot deny it; his conscience would be satisfied, but will justice be enlightened? These suppositions may perhaps be considered as exaggerated, because tin has as yet been found only in small quantities; but these quantities are variable, and it is likewise impossible to meet with a sulphate of iron which does not contain sufficient to give rise to like uncertainties.

All these inconveniences have great weight in medico-legal research, to remedy them it would be proper, before preparing the hydrate, to subject the sulphate of iron to a stream of sulphuretted hydrogen. Another fact, not less important, would likewise make this measure advisable. Arsenic, it is admitted, exists in certain sulphuric acids; may it not happen that the hydrate has been obtained from a sulphate manufactured from such an acid? The new Codex prescribes purified sulphate of iron; the term purified embraces, it is true, the whole ground; but how many persons are there who see in purification nothing more than solution, filtration, and crystallization, and these means are here totally insufficient.

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ART. XV.—PROCESS FOR OBTAINING VERATRIA.

By M. J. Righini.

Take of the seeds of the cevadilla, (*Veratrum sabadilla*,) four pounds, common water twenty pounds; digest for three days in a covered copper vessel, strain off the liquid, and set it aside; bruise the cevadilla in a mortar, taking care that the seeds, which are about the size of a grain of millet, should be well broken; then boil it with twenty pounds of water, holding in solution half an ounce of tartaric acid, until one-half the liquid has evaporated. Strain and boil the residue in the same quantity of water, with one-half the quantity of acid, until reduced to six pounds. The insoluble part is to be put in a press to separate all the liquid, which being added to the other decoctions, is concentrated to the consistence of a syrup. The liquid product obtained by the digestion is now to be added, and the whole slightly concentrated. In this state one pound of concentrated solution of ammonia is to be added, by little at a time, constantly stirring the liquid. Having been allowed to be at rest for five days, the deposit formed is to be separated by a filter, allowing it to drain perfectly. The remaining liquid, which is of a black color, is again brought to the consistence of a syrup; and one-half the quantity of the ammonia used in the former operation, to be added, in the same manner as at first. Having been left at rest for two days, the precipitate formed is to be separated, united to the first, and the whole slightly dried, when it is to be rubbed up with chemically pure animal charcoal, and digested for three hours, in two pounds of alcohol of 40°. The alcoholic tincture is to be filtered, when half cool, into a closed glass vessel, and another pound of alcohol added to the residue, and digestion continued for the same length of time.

By the filtration and cooling of the alcoholic tincture, a brown colored liquid is obtained, which deposits a whitish pulverulent matter. The alcoholic tincture, which weighs

about three pounds, is to be put into an alembic of tinned copper, and thirty ounces of alcohol is distilled off by means of a salt water bath. The residue in the alembic is to be quickly poured into a porcelain capsule, and reduced to a thick extract by the same bath, in which state the veratria, on solidifying, becomes a brown powder.

This veratria, which Professor Soubeiran distinguishes by the name of medicinal, has a resinous aspect, like that so well described by this able chemist, and an excessively burning taste, like that of a corrosive substance; so much so, that my assistant, having placed a portion upon his tongue, produced an excoriation on it, and likewise on his under lip, at least on that portion which was touched by the veratria mixed with the saliva.

Four pounds of cevadilla furnished six pennyweights of medicinal veratria.

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ART. XVI.—NOTE UPON THE BARK OF CEDRELA FEBRIFUGA. By A. Richard.

There is found in the forests of Amboina, Java, and Timor, a tree of majestic proportions, which sometimes attains the enormous height of two hundred feet. The natives of Java give it the name of *Suren*, and Rumphius (*Herb. Amboin.*) has mentioned it under the name of *Surenus*. Dr. Blume, who for a long time resided in Java, of which he has published a Flora, has described it under the name of *Cedrela febrifuga*, because its bark eminently possessed febrifuge properties. Lately, Dr. Forsten has published at Leyden a Latin dissertation upon this bark, in which he has examined it under a botanical, pharmaceutic, and medicinal point of view. We have derived from this dissertation, which is well written, some of the details which we shall now present.

The small family of Cedreleæ, to which appertains the genus *Cedrela*, has been established by R. Brown to accommodate some genera formerly placed in that of the Meliaceæ. M.M. Decandolle, Blume, and Ad. de Jussieu, who have made these genera an especial study, do not consider the Cedreleæ but as a simple tribe of the Meliaceæ. Among the genera which compose it, we will cite *Cedrela swietenia*, and *Kaya*. These are all large and beautiful trees, the wood of which is generally fragrant, and of a reddish tint, with veins. They all possess, in their different parts, more or less astringency and bitterness of taste, frequently united with an aromatic principle. Thus the bark of these trees, and particularly that of the *Swietenia febrifuga*, Roxb., of the *Kaya senegalensis*, Ad. de J., and even of the *Swietenia mahagoni*, is tonic and febrifuge. But in no other species is this property as well marked as in the bark of the *Cedrela febrifuga*, of Blume.

This tree, as has been stated, attains colossal proportions, and grows in the forests of Amboina, of Timor, and Java. Its bark is in pieces, either flat or partially rolled, sometimes partly deprived of their epidermis. Their thickness is about two lines. The external surface, in the pieces that still retain the epidermis, is smooth, or irregular from fissures crossing each other at angles, of a clear gray color, due in part to the lichens that cover it. In those deprived of epidermis, this color is near to that of canella. The internal face is shining, equal, and of a yellow tint; the fracture is very fibrous, taste bitter and astringent, smell faint, and somewhat like that of oak bark. Professor Nees de Esenbeck has published an analysis of this bark, in which he has found an astringent principle of a resinous nature; another principle, equally astringent, but soluble in water, and consequently of a gummy nature; a gummy extractive matter, and some traces of inuline.

Horsfield is the first who, in 1816, made use of the bark of *suren*, or *Cedrela febrifuga*. He employed it with much advantage in the last stages of dysentery, (a disease so com-

mon and destructive in tropical climates,) when the inflammatory symptoms had subsided. More recently, Dr. Blume has administered it in the epidemic fevers of Java, as well intermittent as remittent, and even in those that exhibit the most serious and anomalous symptoms, in a word, pernicious fevers. The best success has always attended the use of this bark, and place it among the most energetic and certain febrifuges. Many other physicians, as Kirkhoof, Waitz, &c., have employed it under the same circumstances.

The decoction is administered, made from an ounce of bark deprived of its epidermis, boiled in a pint of water, down to one-half. An alcoholic tincture is also prepared, and an extract.

The activity of this medicine, although it has not yet been introduced into commerce, has made us desirous of bringing it into notice.

ART. XVII.—METHOD OF DETERMINING THE QUANTITY OF COLORING MATTER CONTAINED IN COCHINEAL.

Extracted by J. DE FONTENELLE.

THE Société Industrielle, of Mulhausen, offered a prize upon this subject, which induced M. E. F. Anthon to undertake a series of experiments for the purpose of resolving the question. We shall now limit ourselves to an exposition of the best method that he has devised for the examination of cochineal. It may, in the first instance, be stated, that chlorine is a very good agent, but it can only be successful in the hands of an experienced chemist; besides this, it is very difficult to procure solutions of chlorine exactly the same, and, moreover, by this reagent, serious errors may be committed, from the length of time it may be left in contact with the extract of cochineal, because the bleaching action of this gas upon carmine, is neither instantaneous or terminated in a

a moment. On this account, this mode of trial has been abandoned. That of M. Anthon is based upon the property which hydrate of alumina possesses of precipitating carmine completely from its solution, so that the liquid shall become clear and colorless. There are only necessary for this method a *graduated cylinder* and some *proof liquid.*

The cylinder consists of a tube of glass, from three-fourths to an inch in diameter, and from twenty to twenty-four inches in length; it is sustained upon a glass bottom, which renders it more convenient for use. Into this tube is poured an aqueous solution, made with seven grains of pure dry carmine; it is prepared by exhausting powdered cochineal with water, evaporating the liquid by gentle heat to the consistence of an extract, treating the product by boiling alcohol, filtering, and evaporating to dryness; the coloring matter left is called carmine. For the purpose of experimenting, seven grains of it are taken, and dissolved in the necessary quantity of water, to occupy in all but three inches of the tube. From the point reached by the liquid, the graduation of the tube commences and proceeds upwards; this point is the zero of the scale. The proof liquid is then poured in little by little, and the vessel is shaken so as to agitate the liquid at each addition, and the lake colored carmine which forms is then allowed to deposit. This is continued until the liquid becomes colorless. At this point, the number seventy is marked, and the space included between 0 and 70 is divided into seventy equal parts, each one of which corresponds to the quantity, per centum, contained in the cochineal. The author has been induced not to make this instrument longer, and not to divide it into a greater number of degrees, because, according to him, there is no cochineal which contains more than seventy per cent. of pure coloring matter.

To obtain the proof liquor, one part of alum is dissolved in thirty-two of water, and ammonia is added, until it ceases to throw down a precipitate, taking care not to add an excess of ammonia. It is this white homogeneous mixture, having a little gelatinous consistence, that constitutes the proof liquor. We

should here observe that it is necessary to agitate before using it. The following is the *modus faciendi:* when it is wished to essay cochineal or its extract, ten grains are taken, reduced to fine powder, and agitated with 100 grains of warm water; when the undissolved portions are deposited, the liquid is decanted and poured into the graduated cylinder, and upon the residuum 100 grains more of warm water are poured; the same process is continued until the zero of the cylinder has been reached, when the cochineal will be exhausted of its coloring matter. The proof liquor is to be added in such proportions that, upon the first addition, the quantity in the tube should be raised to 30 or 35°, and afterwards continued until the liquid in the tube is clear and colorless. Then, upon examining the height to which the mixed liquids have risen, the number marked indicates in hundredths the quantity of coloring matter contained in the cochineal submitted to examination. This method is simple of execution, and so easy that it can be readily executed by an intelligent operator.

Journ. de Chimie Med.

ART. XVIII.—UPON THE PREPARATION OF ESSENTIAL OILS. By E. Soubeiran.

Since the time that Hoffman advised the addition of salt to water in order to prepare the heavier essential oils, Baumé alone has raised his voice in opposition to it, but with little effect upon the opinion of his successors, for all have recommended anew the method proposed by Hoffman; very lately, however, M. Mialhe has concluded, from experiment, that the employment of salt is unnecessary. The advantages that Hoffman attributed to the presence of salt, were the following: to render the water more capable of penetrating and separating the the vegetable substances; to prevent fermentation from taking

place, when dry substances are operated on, which ought to be submitted to previous maceration; and, finally, to increase the temperature of the water, and thus facilitate the extrication of a large proportion of essential oil. This last effect, so in accordance with theory, has led me to doubt the exactitude of the result announced by M. Mialhe, and I have, in fact, found, contrary to his opinion, that upon comparasion with distilled water alone, and salt water, more oil is obtained in the second case than the first.

I made the trial in a copper alembic, and in order to avoid as much as possible all condensation of vapor in the capital, I enveloped it with woollen cloth, as far as the insertion of the worm of the apparatus. I placed in the alembic distilled water with the rectified essence of turpentine, which covered it with a layer three or four inches inches in thickness, and I commenced to collect the products only when the distillation was in full activity, the apparatus being sufficiently heated. Now, during the whole time that the distillation was in progress, the water and the essential oil which were condensed in the recipient, were always in the proportion of 1 to 0.757 in volume, or 1 to 0.66 in weight. These are precisely the relative quantities that should result from the condensation of a saturated mixture of the vapor of water and that of turpentine, at the temperature of 100 degrees, and under a pressure of 76 c., estimating from the tension proper to each of the vapors.

This relation continued so long as the oil covered the surface of the water with a uniform layer; when the quantity diminished so as only to cover the water with large globules, an excess of the vapor of water passed over, and the proportion of the oil was observed to diminish more and more in the product.

I made another experiment by adding to water half its weight of salt. Upon this occasion the relation was completely changed. Water being taken as unity in volume, that of the oil was 1.75; the relation in weight was as 1 to 1.517. Thus theory and experiment coincided. The pre-

sence of the salt augmented the proportion of essential oil. But is the same the case in the treatment of aromatic vegetables?

I poured upon 2500 grammes of cassia, thirteen litres of boiling water; after forty-eight hours I distilled over until the water was no longer milky. Three litres of water were thus separated, from which I obtained by decanting, after three days of repose, five grammes of essential oil, and which retained in solution 5.3 more grammes. I ascertained this by agitating a part of the water with pure ether, and evaporating spontaneously the etherial solution. This water of cassia was poured back again into the cucurbit and again distilled. Three pounds of milky water were obtained; a third distillation afforded no more. By abstracting the volatile oil contained in the distilled water that served for cohobation, I obtained by this second distillation 2.25 grammes.

I then made a parallel trial with the same quantities of cassia and water, at the same time adding 4500 grammes of salt, and I obtained three litres of the milky product, which furnished six grammes of oil, and 5.3 grammes remained in solution; in all 11.3 grammes.

In the second distillation the water ceased to pass clear after half a litre. The oil collected in this part of the operation weighed two grammes. A third distillation afforded no more.

If we compare results, we shall find that, with water alone, the first distillation afforded 10.3 grammes of oil; that with salt water, 11.3 grammes; that the whole of the essence required six litres with the water alone; that the same quantity was obtained with four litres of salt water. In this case there is certainly an advantage; it is, however, of little consequence; it does not compensate for the expense which the employment of the salt occasions, and no advantage results if, in place of saturating the water with chloride of sodium, only one-tenth of its weight is added, as directed by the formularies.

It is remarkable that, in the extraction of volatile oils by distillation, it is always necessary to drive over a considerable

quantity of water in order to obtain the whole amount of oil, the very opposite of what happens when a mixture of water and essential oil is submitted to distillation. This occurs in consequence of the oils being held within the tissues of the plant, and because their proportion is small compared with the quantity of liquid which it is necessary to employ in order to saturate the plants, and also on account of the affinity existing between them and the organic principles with which they are associated, which opposes their free separation.

I poured upon three kil. of powered cubebs, seventeen litres of boiling water. I allowed it to stand eighteen hours, when I submitted to distillation. I arrested the operation when I had removed six litres of water; from its surface was procured seventy-five grammes of oil. I made another trial by adding to the water six kil. 500 grammes of salt, and I only obtained from it six litres and fifty grammes of oil.

I made a new attempt with 2.700 grammes of cubebs, and twenty-five litres of water, without salt: the three first litres which passed by distillation, were productive of twenty-eight grammes of oil, and the three following of thirty-five grammes; in all sixty-three grammes.

I repeated this trial, adding ten kil. of salt to the water; upon this occasion the first four litres gave twenty-five grammes of oil, and the two following eighteen, in all forty-three grammes. These two series of experiments demonstrated a fact which I far from expected, viz., that in the distillation of cubebs, the salt was a positive hindrance to the extraction of the essential oil. I cannot explain the fact; I only repeat it as I have noticed it upon successive trials.

I shall not draw any conclusion from my experiments. If they have demonstrated that in the distillation of a mixture of essential oil and water, the operation is accelerated by the presence of salt, they have also proved, that in the distillation of cassia there is no advantage from it, while, as regards cubebs, it actually is a hindrance. My experiments most conclusively show that the fabrication of the oils, which has been regarded as a well known operation, is, on the contrary, a

subject almost new. The occasion so rarely happens to me to prepare these oils, that my researches can do little, but I hope that they will be taken up by some person more favorably situated. A new and interesting field of inquiry is presented.

Journ. de Pharmacie.

ART. XIX.—ON FLUORINE. By G. J. Knox and the Rev. Thomas Knox.

The authors having taken a summary view of all the researches on fluorine up to the date of the commencement of their experiments, in April, 1836, proceeded to describe the vessels of fluorspar which they used in their first experiments, and exhibited those which were latterly found best adapted for examining the gas. These vessels were of fluorspar wrapped with iron wire for the purpose of equalizing the temperature, so as to prevent the vessels splitting on a sudden application of heat. In place of a flat cover for the vessels, fluorspar receivers were used, the cavities of which were filled with ground stoppers of the same materials. On moving the receivers over the mouth of the vessel the stoppers fall in, and their places are occupied by the gaseous contents of the vessel. On the top of each of the vessels is placed a flat slab of fluorspar, which answers the purpose of a table, upon which the receivers of the gas can be moved. On the slab are four small depressions, in which are placed the substances upon which the action of the gas is to be observed, and over which the receivers, when filled with gas, can be slid. In opposite sides of these receivers are drilled holes, into which are fitted, air tight, clear crystals of fluorspar, through which the color of any gas in the receiver may be distinctly observed. The vessels are supported on a stand over a lamp.

On heating pure fluoride of mercury in these vessels, with dry chlorine, the authors obtained a colorless gas, (as seen through the fluor,) having a heavy smell, not pungent or

irritating, and thereby easily distinguished from chlorine, or hydrofluoric acid. When exposed to the air, it does not fume, as would be the case were the slightest trace of hydrofluoric acid present. The inside of the vessel is found coated with crystals of corrosive sublimate. The gas does not extinguish ignited phosphorous or red hot iron wire, and consequently is, (as Sir H. Davy conjectured,) a supporter of combustion. It detonates with hydrogen, forming hydrofluoric acid. Placed over water, the solution (if such) has all the properties of hydrofluoric acid, *i. e.*, acts on glass, reddens litmus, and gives precipitates with lime and barytes. Placed over dry litmus and Brazil wood paper, the former is reddened, and the latter turned yellow; in no instance are they bleached. When a receiver of the gas is placed over wet glass, the glass is strongly acted upon; when the glass is carefully dried, the action is not so strong as before. When a small piece of dry glass is placed in a perforation in the interior of the receiver, the glass is acted upon, but not more so than when fluoride of mercury alone is in the vessel; from which they conclude that fluorine does not act on perfectly dry glass.

To ascertain the action of the gas on metals, they found it necessary to try the separate effects of hydrofluoric acid, sublimed fluoride of mercury, and the bichloride of mercury, in order to distinguish the action of fluorine from that due to the vapor of these substances. For this purpose bismuth and palladium, at a moderate heat, and gold at a higher temperature, afforded distinguishing tests. To determine the relative attraction of fluorine for those metals upon which it does not act, except at high temperatures, they used as positive poles a battery of sixty pairs of plates, moistened fluoride of lead, palladium, platinum, gold, and rhodium. The palladium and platinum were always acted upon, the gold occasionally, and the rhodium never; from which they suppose that fluorine might be obtained in an insulated state, by electrolysing fluoride of lead in a tube of fluorspar, using rhodium as a positive pole.—*Trans. of R. Irish Acad. and Lon. & Edin. Phil. Mag. and Journ. of Science.*

MISCELLANY.

Iodal.—M. Aimé has described a new compound, which he considers as analogous to chloral, and which should be called iodal, because iodine plays the same part in it as chlorine does in chloral.

This product is obtained by causing iodine to act in the cold upon nitric alcohol; leaving the liquor to itself, the iodine disappears at the end of some days, and is replaced by a liquid heavier than water, and of a red color. This color, which is due to an excess of iodine, finally disappears. The iodal is thus obtained nearly pure; it contains only a little nitric alcohol and nitrous ether, from which, however, it is easy to free it.

This body, in its pure state, is almost without color; its taste is sweet, and its smell somewhat ethereal. Thrown upon burning charcoal, it gives off thick white fumes, which greatly irritate the eyes. Sulphuric acid decomposes it. The alkalies convert it into iodides.

Journ. de Chimie Med.

Iron converted into Plumbago by sea water.—M. Eudes Deslongchamps has found that iron, on exposure to sea water, is converted into plumbago or carburet of iron, and has proved this fact by exhibiting to the Linnean Society, of Normandy, cannon balls gathered near St. Waast la Hogue, which were there deposited in consequence of a naval combat fought by Admiral Tourville, in 1692. These balls, which in form and size did not appear to have undergone any alteration, had lost more than two-thirds of their weight, and could be cut by a knife like a crayon; they contained no iron in a metallic state, and did not act on the magnetic needle. *Ibid.*

Iodine in the mineral kingdom.—M. Del Rio has discovered a new combination of iodine with the metals. On examining some specimens of seleniuret of mercury, deposited at the School of Mines, of Mexico, by M. J. Casas Vrejas, of the state of Queratarо, he observed spots of a brownish red color, which, treated by heat, gave the same characters as artificial iodide of mercury. This eminent person has likewise learned that there is found in the same gangue the iodide and seleniuret of mercury. *Ibid.*

Mode of preparing Mercurial Ointment, by M. Paton.—This method consists in putting into a marble mortar two ounces of old mercurial ointment, and triturating with a wooden pestle, while another person lets fall into the mortar a very fine mercurial shower, produced from a pound of mercury enclosed in chamois leather; the mercury thus divided unites promptly with the fat. According to M. Paton, mercurial ointment may be promptly prepared by this method from fresh lard, when we do not wish to profit by the power which the old ointment possesses, to divide better the mercury. M. Paton directs, when we have not the chamois leather, to form a bag of mercury by enclosing it in several doublings of very fine linen; or better, to use a metallic sieve with very fine net work.

Journ. de Chimie Med.

New mode of preparing the Bicarbonate of Potassa, (Annalen der Physik und Chemie.)—The carbonate of potassa, whether dry or in solution, absorbs very slowly, as is well known, the second proportion of carbonic acid necessary to convert it into a bicarbonate. M. Wöhler has found that charcoal, by its porosity, when mixed with this salt, facilitates in an uncommon degree the formation of the bicarbonate. He proceeds in the following manner: Crude tartar is charred in a covered crucible; the carbonaceous mass is slightly moistened with water placed in an appropriate vessel and subjected to the action of carbonic acid gas. The absorption takes place with such rapidity as to heat the mass so considerably, that it is necessary to surround the vessel with cold water, to prevent the decomposition of the bicarbonate when formed. By the diminution of the temperature we know when the saturation is complete. The mass is then to be lixiviated with the least possible quantity of water, at the temperature of from 85° to 100° F. When the filtered solution cools, the greater part of the bicarbonate of potassa is deposited in fine crystals.

Journ. de Pharm.

Observations on a case of poisoning by Strychnine—employment of ether and the oxide of zinc, by M. Paton. Some time since, a physician prescribed for a person affected with a constant trembling of the hands one grain of strychnine in eight pills; four to be taken in the morning, at ten minutes interval, and the other four in the evening in the same manner. By mistake the patient having taken the whole eight pills in the morning was severely affected immediately after taking the last pill; his legs refused their support; a determination of blood to the head suddenly appeared, causing fear of apoplexy; the symptoms became more and more alarming—the physician was sent for, but was then absent. The apothecary, who had prepared the pills, came at once, but alarmed at the state of the patient, he returned, and asked me to give something to the man, whom he considered as threatened with immediate death. I ran to

the patient, whom I found in this state: his face red; the eyes sparkling and prominent, with the pupil a little dilated; the frontal veins were full of blood and very much enlarged; he retained his consciousness; his arms and hands were agitated by convulsive movements. I promptly asked whether they would permit me to use such means as I should consider suitable; receiving an answer in the affirmative, I administered a a grain of emetic in a spoonful of lukewarm water, and endeavored to cause vomiting by tickling the fauces. The patient refusing to take another grain of tartarized antimony, vomited but a small quantity of whitish glairy matter. I had recourse to the following composing draught: ether sulph. gtt. xxx., aq. laur. ceras. gtt. iv., syrup altheæ ℥i., aq. tilliæ ℥iij. M. This draught taken by spoonsful, in the course of half an hour produced evident relief. I gave the patient during the day, (ten hours had elapsed since the symptoms appeared, and eleven when I commenced the treatment,) a mixture composed of zinci oxid. gr. viij., ether sulph. ℥ss., aq. aurant. flor. ℥ij., aq. lactucæ ℥iv., syrup valerian ℥iss. M. The following morning the patient, who had slept a little during the night, was completely restored. *Journ. de Chimie Med.*

Accidents caused by Bryony Root.—Already, in many works, cases of poisoning have been published, which were due to the bryony root, (*Bryonia alba,*) known also under the names of snake weed, the devil's turnip, parsnip turnip, and bastard turnip. A mistake took place lately at St. Savine, (Aube,) in which a whole family narrowly escaped the fatal effects of the employment of this root. The facts are these. Yesterday, November 18th, 1836, a root of bryony, which had without doubt been mistaken for a parsnip, was put with some pulse in a pot, and soup prepared according to custom; but this soup having a detestable flavor, was given to a pig, who ate it with avidity; soon after, this animal was seized with violent convulsions, in consequence of which it died.

At Paydie-Codon, in the department of Aube, five persons have been a prey to intense suffering in consequence of a similar mistake.

Journ de Chimie Med.

Codeia and Morphia.—M. Koene, of Brussels, in a memoir entitled *New Observations upon a Double Salt of Codeia and Morphia*, has arrived at the following conclusions:

1. Codeia and morphia form with chlorohydric acid a salt not decomposable by ammonia.

2. Ammonia does not enter into the composition of the double salt.

3. The quantity of morphia in the double salt is less than that of codeia, and from a single experiment is as one to three.

4. When the chlorhydrate of codeia and morphia is in solution with the

chlorhydrate of ammonia, the first crystallizes, and the last remains in the mother waters.

5. Ammonia decomposes entirely with heat the double sulphate of these two vegetable alkalies; but the combination remains unaffected, if, during the evaporation, the ammonia is not in too great an excess.

Bul. de l'Acad. Roy. des Sciences de Brux., et Journ. de Chimie.

Sulphuret of Nitrogen.—M. Soubeiran announced the discovery which he had made of sulphuret of nitrogen. It was obtained by acting upon chloride of sulphur with ammoniacal gas, taking care to have the ammonia in excess and to prevent any increase of temperature. The product of this operation is a mixture of chlorhydrate of ammonia and sulphuret of nitrogen, which may be separated by means of water. This new compound is of a yellow color, inodorous and of an acrid taste; it is soluble in alcohol and ether, nearly insoluble in water, but in it is slowly changed into hyposulphate of ammonia. It is decomposed explosively by the sudden application of heat, or by percussion. When mixed with glass it decomposes tranquilly, giving off nitrogen and sulphur; it is composed of one proportion of azote and three proportions of sulphur.

Journ. de Pharmacie.

Mercury in the Saliva during Ptyalism.—M. Gmelin, of Heidelberg, reports the following experiments upon this subject. (*Annalen der Physik und Chemie.*)

Experiment 1. The subject who afforded the saliva of this experiment, had for a long time been rubbed with the blue ointment, without taking mercury by the mouth; after the frictions had been omitted for several days, the fluid was collected for trial. It was brownish, turbid, and contained large flocculi of mucus. Heated by a salt water bath, it underwent no other change than the separation of the mucus in a more consistent state. It therefore could not contain albumen. Two pounds of this saliva were evaporated to dryness, at the same time adding nitric acid gradually. The residuum was then treated by nitric acid and evaporated again, but not to complete dryness. During the solution of the pale yellow residue in water, a fatty substance in notable quantity was separated, which when cold was solid, but of oily consistence at a low degree of heat. Perhaps this fatty matter is the same as that which the saliva of a healthy man afforded upon a former occasion, (*Tiedemann & Gmelin, Digestion*, p. 11,) with the sole alteration produced by nitric acid. The watery solution, separated from the fatty substance by filtration, afforded, when a current of sulphuretted hydrogen was passed through it, a precipitate of sulphur, induced by the presence of the nitric acid: this precipitate had a brownish yellow color. It was collected upon a filter, washed, placed in a watch glass, evaporated with nitromuriatic acid,

heated with diluted muriatic acid; and then, according to the method of Smithson, brought in contact with gold and tin. After an action of several hours, the gold exhibited itself a little colored of a whitish gray, but very slightly. A counter experiment led me to the conviction that tin communicated to gold, under the influence of pure muriatic acid, a similar gray color. This exeriment then was not decisive.

Experiment 2. The saliva which afforded the matter of this experiment was also procured from those who had undergone frictions, and had not taken mercury by the mouth. It was of a very pale yellow color, with whitish flocculi. It was treated exactly in the same way as the preceding, except the modification of Smithson's method, to be indicated. It presented the same phenomena, especially the absence of evident coagulation, a large quantity of fatty matter was separated, and it gave in equal amount, by the action of sulphuretted hydrogen, a brownish yellow precipitate of sulphur; after this had been oxidized by nitromuriatic acid, and the residue by evaporation treated with dilute muriatic acid, a small strip of gold leaf was introduced into the liquid with a piece of iron wire; in fact, in a preliminary experiment, the iron, under the influence of the muriatic acid, did not change the color of the gold or cause it to form an amalgam, except when mercury was present. The next day the gold leaf was evidently amalgamated, and assumed, when rubbed, the brilliancy of silver.

To isolate, as far as practicable, the precipitated mercury, the gold leaf was doubled up and placed in the narrow part of a tube similar to that employed by Berzelius to separate arsenic from the sulphuret of this metal, by aid of carbonate of soda and hydrogen, and heated to redness in a current of hydrogen gas. It rapidly reassumed its yellow color, and afforded by degrees, in the straight portion of the tube, a delicate metallic layer, in which could be perceived, by aid of the glass, evident globules of mercury.

To see if a portion of the mercury had been precipitated on the iron, this was submitted to the same trial, and yielded a thin layer, in which were evident very small globules, which, at the end of several weeks, were united together.

This experiment demonstrated the presence of mercury in the saliva obtained during ptyalism, although in very small quantity. It is necessary at the same time to take into consideration, that large proportions of the mercury may have been volatilized during the reiterated evaporation of the saliva. A. G. V.

Journ. de Pharm.

Oil of Tea, by Mr. R. D. Thompson.—Travellers in China assure us that a species of fixed oil is as commonly employed as the olive oil in Europe for economical purposes, and that this oil is probably the product of the vegetable that furnishes tea, or another species of the same natural

family. Thompson thinks that it is extracted from the seeds of two genera, Thea and Camellia. This oil has hitherto been unknown in Europe. The following are its properties:—When fresh it is inodorous, of a pale yellow color, yields no deposit, is insoluble in alcohol, very little so in ether, burns with a clear white flame, resists cold of 40° F. (4.44 C.) without thickening, at 39° resembles emulsion; its specific weight is .927; it is composed of

Elain,	75 parts,
Stearin,	25 "
	100

As regards its elementary composition, this is according to this chemist,

Carbon,	78.619
Hydrogen,	11.527
Oxygen,	9.854
	100.000

The author is induced to believe that this oil might be an important object of trade in the East, because it is superior in its qualities to cocoa nut oil, as also to other oils commonly employed in Asiatic countries, as well for illumination as nourishment. *Journ. de Chimie Med.*

The preparation of strong Mercurial Ointment, by J. LALANDE.—To obtain from lard and mercury in determinate quantities, by a longer or shorter agitation, so perfect a mixture that the smallest portion shall contain the two bodies in their respective proportions, is an operation of such importance, that a great number of pharmaceutists have made it the object of their study. All, by different means, have arrived at a result nearly identical, but, nevertheless, inferior to that process to which I have given the preference after many trials. The annual use of a large quantity of mercurial ointment to stop the itch in sheep, made me perceive that it would be an advantage if I could obtain a prompt and infallible mode to form the most exact possible mixture of the lard and mercury.

℞. Purified mercury, lb. iv.
Spermaceti,
Almond oil or lard, *aa*, ℥ v. Modus faciendi.

Strain into an iron mortar the lard and spermaceti, well united by melting over a gentle fire, then add the mercury, and commence trituration with a pestle of wood or iron; after the labor of some hours, a deep slate colored mixture will be obtained, in which no globules can be perceived by the naked eye, or even by a strong magnifier. The only thing which can mark with certainty the termination of the operation is, if un-

sized paper, or the cuticle of the hand, on absorbing the fat, should leave the metal in such a state that the globules are imperceptible to sight, from being kept asunder by an intervening substance. I have neglected to fix the time necessary for the operation. Sometimes every thing being the same, I have had to continue the labor a longer, and at others a shorter time. I attribute this difference to the temperature of the atmosphere; the most suitable appeared to be between 55° and 60° F.

This simple, and easily executed process does not introduce any foreign body capable of altering its mode of action on the skin.

Journ. de Chimie Med.

Preparation of Syrup of Ether.—M. Paton, èléve of Pharmacy, at Clèves, has proposed the following method for the purpose of rendering this preparation efficient:

℞.	Sugar in coarse powder,	21 ounces.
	Distilled water,	6 "
	Sulphuric ether,	2 "

Pour the whole into a stopped flask, and, after having agitated the mixture some minutes, add

	Distilled water,	6 ounces.

Agitate anew the mixture from time to time during four or five days, and filter through paper in a funnel with a cover.

The syrup of ether prepared in this way preserves indefinitely its odor and a large proportion of its properties. Besides, variations of temperature do not render it turbid, as when it is prepared by the usual method.

Observations.—M. Paton having observed that the properties of syrup of ether became weaker in consequence of the vessel being so frequently opened, when it was kept on hand, devised the above method of preparation, convinced that the product which results from it has not the same inconveniences. We are of opinion that this is not the case, and that his method, under this view at least, has no advantage over those directed by many Pharmacopœias.

When the syrup of ether has been well prepared, it does not become clouded by a moderate reduction of temperature, but under all circumstances, the appearance of this phenomenon is a proof that the syrup was saturated with ether. It is possible, moreover, to restore its transparency by the addition of a small quantity of water.

We have published in one of the numbers of this Journal a method communicated by M. Paton; by means of which lozenges of ipecacuanha were obtained but slightly colored. This method consists in mixing the powder of ipecacuanha with sugar previously made into a paste with the mucilage.

Upon this occasion, several individuals suggested to M. Paton, that

the same end would be attained if emetia were substituted for ipecacuanha. This, however, he entirely disapproves of. *Journ. de Chimie Med.*

Sulphate of Manganese employed as a purgative.—Mr. Th. Thompson states that the ordinary sulphate of manganese is well known to chemists, but it has not appeared, until recently, to exist in three states, differing from each other by their water of crystallization.

The *first* is obtained accidentally in delicate scales of a red color; it is composed of

1	atom sulph. acid,	5
1	" prot. ox. mang.	4.5
3½	" water,	3.75

The *second* crystallizes in beautiful transparent rhomboidal forms of the same color as the preceding; it is composed of

1	atom sulph. acid,	5
1	" prot. ox. mang.	4.5
4½	" water,	5.0625

The *third* crystallizes in small oblique prisms, with angles of 148° and 30°. This is the usual form; it is composed of

1	atom sulph. acid,	5
1	" prot. ox. mang.	4.5
5	" water,	5.62

Mr. Thompson has tried, during many years, the use of this salt in the infirmary of Glascow, and has found that when administered in the same dose as the sulphate of soda or magnesia, he obtained the same results. It can be obtained recent by treating with water the residuum left when chlorine is fabricated. It remains to be determined whether the medicinal properties of this salt merit the attention of the physician. Mr. Thompson has experimented with it solely as a purgative, but it is known, from the observations of Dr. John Cowper, that its metallic base has an especial action upon the animal economy; thus he has seen many workmen employed in a manufactory where bleaching powder was prepared on a large scale, the base of which is the protoxide of manganese, suffer from symptoms of lead colic, &c. And besides these, the experiments of Gmelin have shown that manganese, under the form of sulphate and manganesic acid, is a weak poison for dogs and cats, producing inflammation of the stomach, of the duodenum and liver.

Journ. de Pharmacie.